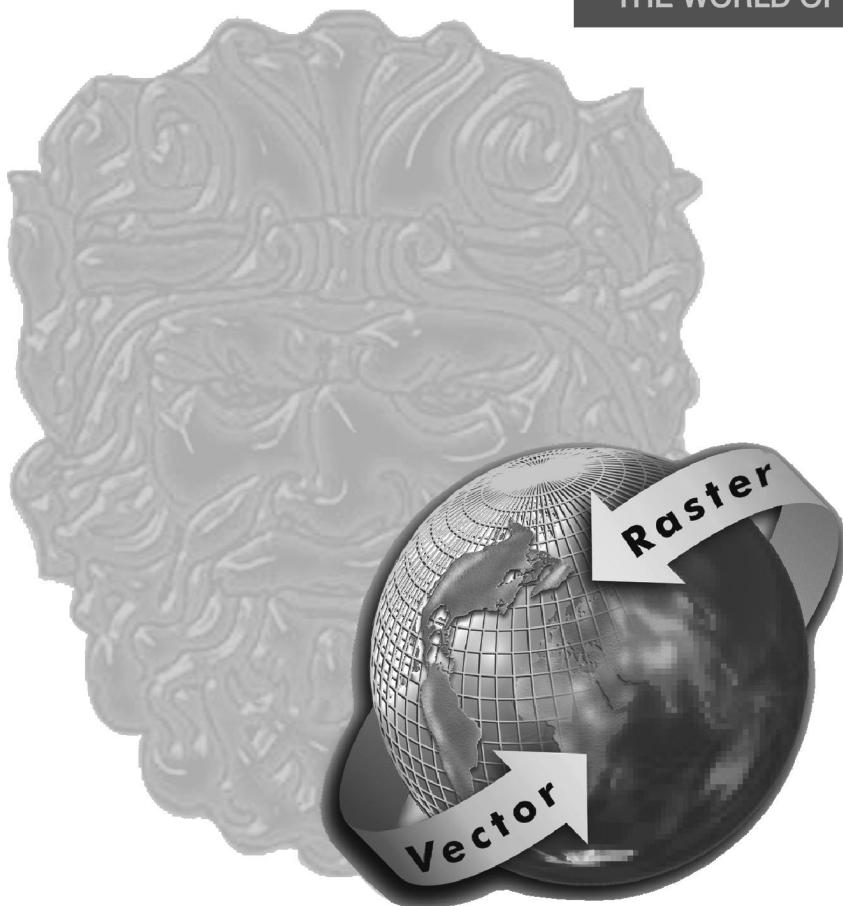


VP HybridCAD®

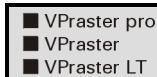
THE WORLD OF RASTER AND VECTOR

V 6.7



- **VPraster® pro**
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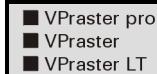
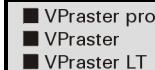
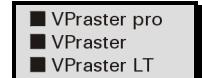


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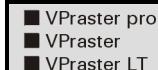
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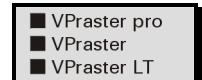
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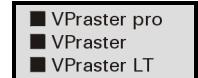
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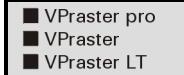
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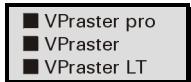
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Section 1

This section applies to:



Introduction

Welcome to the "World of Raster and Vector!"

Congratulations on your **VP HybridCAD** software purchase from **softelec**, a specialist and market leader in raster-to-vector conversion and hybrid editing software for the PC. Since its introduction in 1990, **VP HybridCAD** software has constantly been improved for quality and productivity. New algorithms and programming techniques have resulted in extraordinary quality improvements, including needle pegging conversion speeds. Our **VP HybridCAD** technology assures that you are obtaining the finest in professional products for your scanning, archiving, raster and vector editing, and conversion applications.

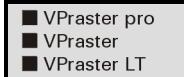
What is **VP HybridCAD** and who needs it?

The importance of raster data processing has seen notable growth in the field of CAD. Legacy information such as "*old*" drawings and technical documents often found as paper (copies, blueprints, transparencies) or come as gray level and color images (photographs, films, color prints). Redrawing them manually into CAD (using CAD functions or a digitizer) is very time consuming, can be inaccurate, and costly. To overcome these drawbacks, scanners for small and large formats are used to generate raster data (digital photographs) from legacy documents which can then be quickly converted to CAD entities.

VP HybridCAD is a family of software products with advanced raster editing capabilities, as both stand-alone and for use inside AutoCAD. In addition, image data can be converted into intelligent vectors your CAD system understands. As an application to **AutoCAD** and/or **AutoCAD LT VPraster series** software is capable of loading, hybrid editing, plotting, and saving raster data of black/white, color, or gray scale images. **RasterDWG** is a true AutoCAD DWG format that contains both vector and raster data. Raster can be in color, gray scale, or black and white. A freeware utility called **RasterDWG (RDWG)**, once installed into AutoCAD is all that is required to load, view, and plot the raster entities while in AutoCAD. No more broken links to external image references, because with RasterDWG it's all in a single file.

VP HybridCAD applications are for:

- Architects, structural and civil engineers, regional and interregional planning departments, and facilities equipment and maintenance
- Mechanical design and process engineering
- Cartography and GIS applications in general



- Land Survey engineers and Land Register documents
- Any structural planning and design

Everyone using a CAD system will inevitably face this question: "*How do I capture paper information for use in my CAD system in a manner that saves time and money?*" At **softelec**, we firmly believe that **VP HybridCAD** software clearly responds to this question in many positive ways and that it offers the best solution available for any application.

Basics:

Raster data / Vector data

Scanners or other devices generate **raster data** when they scan a document. In the case of a monochrome rendition the document's contents are represented as a matrix of black and white pixels. In gray level rendition, representation will also be in pixels (commonly 8 bit, corresponding with 256 gray tones). Color scanning will, of course, result in color pixel representation with 8, 12, 16, 24 or 32 bits of color depth. The individual pixels bear no logical relation to each other. They represent some sort of a "*digital photography*" of the document's content as computer data.

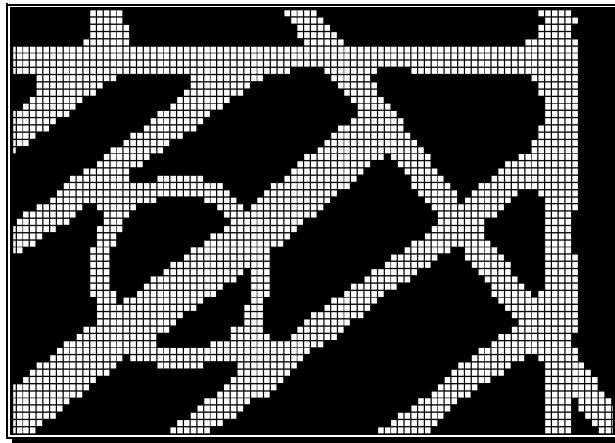


Figure 1: B/W Raster Representation

Pixel density is specified as number per unit of length, in most cases as **DPI** (dots per inch). Numerous **raster data formats** exist (**TIFF**, **GP4**, **RLC**, **PCX**, **BMP**, **GIF**, etc.); they describe position and color of the pixels comprising the image.

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Today, monochrome large format scanners are common in technical CAD applications. These scanners generate binary raster data (black and white pixels) which make for extremely compact raster files resulting from high-compression algorithms (most well known formats: TIFF group 4 or CALS group 4).

In the field of cartography, for instance, satellite recording generates gray level and color images. They usually contain additional information which are processed and analyzed in GIS applications. Basically, gray level and color raster files do not differ from binary raster data. Their file sizes, however, disproportionately increase due to very limited compression options without loss of information. Thus, DIN A0 (E-size) color drawings may result in raster files of 500 MB or more.

All AutoCAD elements are **vector data** representing geometrical elements, such as **lines**, **circles**, **arcs**, **text**, etc. They form the basic elements in a CAD system and any other – more complex – drawing element will be composed of them. Moreover, all vector elements can easily be picked, moved, deleted, or copied as entities on-screen (and in-file, of course). Color coding serves as an additional information marker representing line width, hierarchical structuring, area bounds, and others.

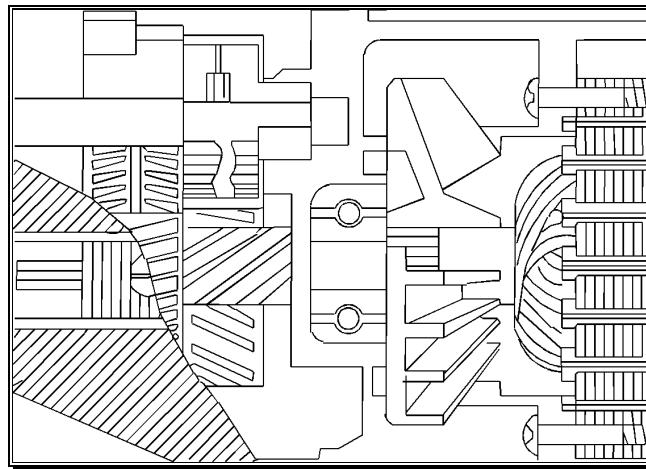
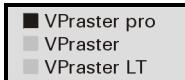


Figure 2: B/W Vector Representation

With the introduction of scanner technology, manually created drawings are obviously easy to render as digital data. The raster files created, however, are only of real use in CAD programs once they have either been made available by suitable software: Either directly through a raster-to-vector conversion or through **hybrid technology** allowing for parallel editing of raster and vector structures.



Raster-to-Vector Conversion

Every raster-to-vector conversion (vectorization) involves a process of interpretation in which the pixels of the raster images are converted to vector elements. If the original document contains clear and unambiguous pixels, the process generates a 100% vector file that can be edited in CAD programs. However, unclear or missing areas in a poor drawing caused by the effects of age, the imperfect manual preparation, and weathering of ink, pencil, or foil does not provide logical raster structures; therefore the scanned image will be converted inaccurately. Nevertheless, using comparisons and approximations, it is still possible to generate the most probable vector representation. Once the raster file has been converted into a vector file, modifications and corrections of any misinterpretations can easily be made with an elaborate source of "smart" editing tools.

There are different methods of vectorizing raster data, depending on their color depth. Since the vectorization process is based upon binary files, i.e. the file must only contain active foreground pixels on an inactive background, B/W images (bi-level) can be converted without additional operation. Vectorizing colored or gray scale images (multiple color or gray level) can only be achieved by generating binary images through color reduction and separation, followed by converting and merging the conversion results as a single CAD file. For example, all red raster pixels can be separated as a raster object and converted using the same procedure as with B/W images. Similarly, gray scale files can be vectorized by separating levels of gray.

For most technical drawings and documents, and including cartography (GIS) applications, there are two principal vectorizing methods, plus a third alternative:

- **Centerline Vectorization:** based on a skeleton (thinning) method
- **Outline Vectorization:** based on a outline tracing method.
- **Centerline+Outline Vectorization:** based on thinning and outline tracing.

Centerline vectorization is used if the image contains lines, circles, arcs, and other more complex elements based on these elements, but in the absence of solid raster objects. The raster image is reduced (thinned down), starting with the edges of the areas of set (active) pixels until only the pixels in the center are left. These are then replaced by a series of line elements (polylines) in which the nodes exactly reproduce the topology of the scanned image (raw vector data). Information regarding line widths in pixels is stored and interpreted later for layer separation using automatic post-processing techniques.

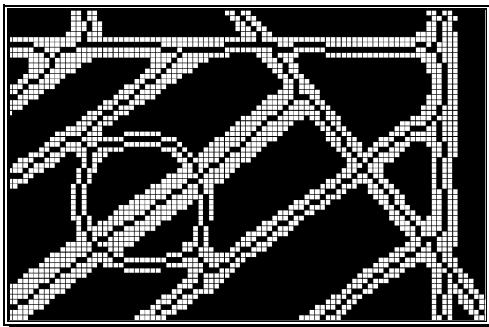
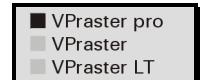


Figure 3: Centerline Vectorization

Outline vectorization is where the perimeter of all pixels is represented by closed polylines. This "hollowing out" method is suitable for vector-based representation of an area which centerline vectorization would normally render as a single line of relevant width.

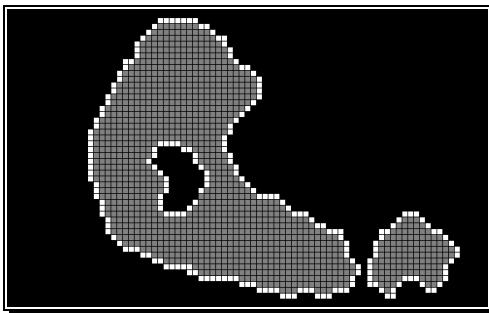
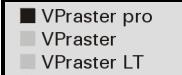


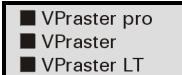
Figure 4: Outline Vectorization

The two methods described can also be used in combination as **Centerline/Outline Vectorization**. It is used when a drawing contains both, line structures and solid filled areas. A defined raster width value (threshold) determines when the vectorization process uses centerline, (below the threshold value), or outline vectorization (whenever the raster width equals or exceeds the threshold value). Drawings having both: thin lines and solid objects convert best using this method. A small threshold value will be more sensitive to smaller solid objects or pixel clusters. User experimentation may be required for best results.



Vector Post Process

The actual interpretative intelligence becomes evident with **vector post-processing**. Based on the topology of raw vector data it applies tolerance criteria and comparative interpretation techniques to recognize and extract lines, circles, arcs, and higher elements such as text, symbols, blocks, and hatch. This process is controlled by parameter settings that can be adjusted to achieve the best possible result.



Product Features

The **VPraster series** of **VP HybridCAD** consists of powerful ARX applications to both: **AutoCAD R14/2000** and/or **AutoCAD LT 97/98/2000**. In joint operation with the CAD system they provide the most efficient way to process and edit raster and vector data. Moreover, all CAD data (e.g. raster and vector data) can be saved in **one** hybrid DWG file (**RasterDWG®**). Importantly, this will ease the file administration and the exchange of hybrid drawings with other companies.

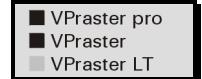
All **VP HybridCAD** software products are based on the most advanced 32-bit programming methods. They also feature a high standard in user-friendly operation and the integration into AutoCAD leaving no considerable difference in processing either vectors or raster.

General Raster Data Handling

One or more raster files (B/W, gray level, or color) can be imported or loaded as an external reference to a standard AutoCAD R14 DWG file or loaded from a RasterDWG file.

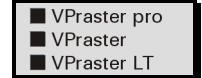
A hybrid drawing can be plotted with the standard AutoCAD plot command. Raster information and AutoCAD elements can be sent – together or separately – to the plotter.

Options for saving raster files include the standard AutoCAD procedure with indexed separate raster files and the **VP HybridCAD** RasterDWG procedure saving raster and AutoCAD elements in one single hybrid file. This RasterDWG file is compatible with AutoCAD while all contained AutoCAD elements will be read by any AutoCAD system. A freeware utility (RDWG) is provided to also display and plot the embedded raster information if VPraster or VPraster LT is not installed.



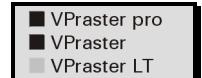
Scanner Interface

The integrated scanner interface for the most popular large format B/W and color scanners allows for direct capture of drawing data into AutoCAD. Thus, the time consuming process of activating any external scan software, saving the raster data and then importing the data is eliminated. (See Appendix B for scanners supported.)

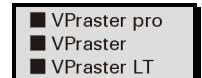


Raster File Editor

The professional raster file editor in **VP HybridCAD** products has been designed for extensive file editing of the complete raster image: crop, trim, deskew, rotate, despeckle, fill holes, mirror the file, split, and merge raster files, rubber sheeting, etc. The rubber sheeting function provides elimination of local distortions in the loaded raster image, which can be caused by aging, incorrect drawing design, and/or scanning tolerance errors. This will result in high precision calibration which is especially important in cartographic applications (GIS).

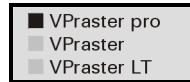


Oversized raster images, exceeding the maximum processing capacities of **VP HybridCAD** software can still be loaded and split into as many as 25 single image files. Additionally, raster files can be merged with options of free positioning, rotation, and scaling for best placement to each other.



Hybrid Editor

The hybrid editor provides functions to edit raster data and vectors. This includes the drawing of lines, circles, and arcs using different lines and line styles, the copying and deleting of elements or areas, and the editing and insertion of text and many more using the standard AutoCAD drawing and editing commands. While drawing a vector entity, the underlying raster data can be automatically deleted by user settings. At any time, however, single or grouped elements can be made part of the raster file by rasterization.



Vector Editor

On the vector side, single vectors can be combined to lines, circles, or arcs. Text generated by the automatic character recognition function can be reviewed and edited if necessary. You can transfer elements to different layers, correct angles, and drawing errors or interpretation faults. Different elements can be associated to form blocks, and these blocks can be subsequently exploded.

In addition, new vector elements can be generated, moved, copied, or replaced. Entering new text and hatch pattern creation are also supported. All elements recognized during the vector post-processing can be manually drawn.

Raster-to-Vector Conversion

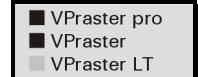
Raster files that you have modified or "*cleaned up*" using the raster editors can be vectorized using **VPraster pro** in whole as a single operation or in sections. The vectorization process consists of **two steps**:

- **Raw Vectorization**
- **Vector Post Processing**

You select one of three vectorization methods followed by an automatic post processing operation. The first step creates a 'raw' vector overlay, which is displayed in white above the raster image. To complete the conversion, the post processing is executed as a second step running on user defined parameters. **VP HybridCAD** software provides an initial set of predefined parameter files (.PCF) for various applications; these files can be modified to meet specific recognition requirements and saved for later use. Select a suitable parameter file, make any modifications, and then start vector post processing. The result of this operation replaces the raw vector data with intelligent vector entities. Colors are used to denote line-width classes and different elements, such as arcs, circles, text, symbols, blocks, and hatches.

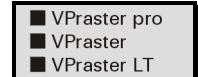
Symbol Search

Symbols can also be searched for and converted into blocks, even with associated attributes. First, the search symbol (prototype) is created by selecting one or several target symbols, which is then saved as a prototype symbol file and used for the search and replacement of matching objects. The symbol files become a part of the user's library.



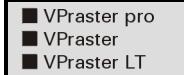
Tracing (Line Following)

The tracing module provides interactive and selectable raster-to-vector conversion of raster entities or areas. Options include the generating of CAD entities (lines, circles, etc.) or outlines (polylines/splines). The latter is important in GIS applications. The underlying raster of a traced element can be erased automatically if necessary.



Gray Scale and Color Processing

Very simple yet powerful functions are available for color and gray scale images: conversion, reduction, and manipulation. Special classification algorithms provide for color pattern recognition assigning a new color to a selected pattern area. The intelligent picking applies not only to B/W structures, but also to a color or a color pattern.



Concept of this manual

This manual has been organized to help you to quickly find operation terms, commands, and description of functions. The manual applies to the following VP products: **VPraster pro**, **VPraster** and **VPraster LT**. The icon on the top right on each page indicates to which product(s) the information and/or commands apply. If specific commands on a page are limited to other products or product groups this is marked with a corresponding icon.

Great efforts have been made to define each function and each setting of a parameter only once in detail. Therefore, an alphabetic index provides a quick means of finding these descriptions.

Keys and key combinations are represented by [] enclosing the keys' designation. For example, the "Enter" or "Return" key is shown as **[Enter]** whereas a key combination (short-cut) opens as **[Ctrl + C]**.

Menu and command line commands are printed in bold ***italics***.

Functions that can be mouse-clicked for activation/deactivation in a check box are represented as **[on/off]**.

Value entries are either quoted with the absolute value range by **[unit]** or they depend on the selected drawing unit **[bu]**.

The given **value ranges** do not necessarily define an internal limitation, but specify a meaningful range – be aware that using values outside of the "normal" range can cause unexpected results. **Default values** represent values either set up during installation or which will be used, e.g. when parameter values are reset.

Conclusion

So, once again we say: "**Welcome to the softelec world of raster and vector**".

This manual will familiarize you with all the functions of **VP HybridCAD** software. It is meant to be both: a source of reference and a guideline to the latest raster/vector processing technology. The most expedient way to learn your selection of **VP HybridCAD** software is to first take the opportunity to view the **VP TOUR** multimedia from the CD, though this tour is more specific for VP-Win stand-alone products, but the command functions are identical. Afterwards, install the **VP HybridCAD** software selection you've purchased and start with the **Tutorial (Section 3)** and follow the applicable lesson series. Once completed, you will have command of **VP HybridCAD** that can only increase your CAD productivity.

Have fun with VP HybridCAD!

As a reminder, please visit our web at <http://www.softelec.com> for the latest information and updates.

Section 2

Installation

This section applies to:

- VPraster pro
- VPraster
- VPraster LT

Introduction

The **VP HybridCAD** products **VPraster pro**, **VPraster** and **VPraster LT** are AutoCAD Applications (ARX) and require **AutoCAD R14/2000** or **AutoCAD LT 97/98/2000**. Depending on the configuration of your computer network you may install the software using different methods.

Local Installation

This is the recommended setup, where all program files are installed on the users computer. If the computer is not on a network, **VP HybridCAD** software can only be installed as a local system. Also, the local installation provides the speediest operation and does not generate network traffic, even if part of a network — except for file transfers on the network.

Server Installation

On a computer network you may install the software onto the server hard disk. User dependent configuration files are generated locally by a special client setup to allow customization. It may take some time to start the software when the server is busy. If the server is down or there are other network problems, **VP HybridCAD** will not operate.

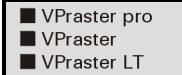
Software License (Hardlock)

A **VP HybridCAD** hardlock may contain one or more product licenses. Regardless of the installation mode and the number of licenses controlled by the hardlock there are two methods of operation:

1. **Local Licensing**: You need to attach the hardlock (dongle) to one of the parallel ports of the computer where **VP HybridCAD** is installed. Typically, this method of operation is used if the hardlock contains a single license only. Then, for every additional **VP HybridCAD** installation an additional single license hardlock is required.



Local Licensing does not require the installation of the **VPLicenseManager**. All Windows operating systems (see above) are permissible.



2. **Network Licensing:** This method of operation is used for hardlocks containing two or more **VP HybridCAD** licenses, but also may be used for a single license. If you want to use this as a "floating" license, where you can access **VP HybridCAD** on any networked computer, but only one operation at a time. You need to attach the hardlock to a network server ("dongle server") running the **VPLicenseManager** so that the license(s) is accessible by other workstations.



The **VPLicenseManager** requires an additional installation and only is supported in **Windows NT**.

Hardlock Driver

The workstation or server having the hardlock on its parallel port needs a system driver for proper operation. This driver is provided with your package and is installed together with the **VP HybridCAD** software. You may also install it manually by following the instructions found in the file **README.TXT** on the CD.

Package Contents

Your **VP HybridCAD** package contains the following:

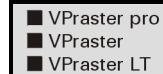
- 1 User manual
- 1 **VP HybridCAD** CD
- 1 Hardlock (dongle)
- 1 Registration form

Attaching the Hardlock (Dongle)

Attach the **male** side (the side with the pins) of the hardlock to one of your computer's/server's parallel ports (LPT1, 2, or 3). Typically, up to five hardlocks can usually be stacked together including a printer to the device(s). If a printer is connected, it should be turned on to provide proper termination, otherwise the hardlock may see false signals (due to reflections) that will cause the program to request a hardlock installation.



It is physically possible to attach the **female** side of the hardlock (the side with the sockets) to certain types of serial port connectors (25-pin male connector). The hardlock will not work when connected this way and may even be damaged.



Do not connect devices like a tape streamer, a CD ROM drive or similar equipment to the same parallel port as your hardlock. Also running file copying applications like Laplink or similar products on the same parallel port causes malfunction to the hardlock or the application.

Installing VP HybridCAD Software

General

The install program **SETUP_VP.EXE** walks you through each step to successfully install and configure the software and the hardlock driver. If your CD **autorun** is enabled, the initial screen will pop up automatically upon insertion of the CD offering you several choices. Also, enjoy an introduction to the features and functions of **VP HybridCAD** following the **multimedia** show.

The Local Installation and the Server Installation are executed with the same setup which allows you to specify several options. These include the target location and the components of the **VP HybridCAD** software.

Before starting the setup routine please make sure to terminate any running applications and read the file **README.TXT** which is located on the CD.



To install a new version of your **VP HybridCAD** program, you **MUST** uninstall the original installed product first!



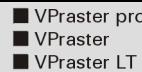
Start and close **AutoCAD** at least once before installing **VPraster pro**, **VPraster** or **VPraster LT**.

The **system driver** for accessing the hardlock (dongle) will be automatically installed together with the **VP HybridCAD** software.



Administrator rights are necessary to install the hardlock driver under Windows NT.

After a successful installation of the software, it is often necessary to reboot the computer in order to allow the operating system to update the DLLs, especially for NT and AutoCAD users. A dialog box will appear, asking the user to restart the computer now or at a later time.



Performing the Installation

The setup is started automatically after inserting the CD into your CD-ROM drive (**autorun**). Only if your Operating System (OS) does not support this or **autorun** is disabled you have to start the setup program **SETUP_VP.EXE** manually from the root directory of the CD.

Installing under Windows 95/98 & Windows NT 4.x/2000

Click on the **Start** button to activate the **Control Panel** from the **Settings** menu. Double-click the icon named **Add/Remove Software** and follow the instructions.

Alternatively you may double-click **SETUP_VP.EXE** directly from the **Explorer**.

In the initial setup window click the item "**VP HybridCAD Products**" and select the desired program language from the dialog. In the sequel you are guided through the setup dialogs allowing user defined settings.

Local Installation

Follow the steps through the installation. We recommend to choose "**typical**" as the setup type.

Server Installation

Follow the steps through the installation. You must choose the "**custom**" setup type and then check on the component "**Server Installation Files**".

After a successful installation you will find the subdirectory **client** in your **VP HybridCAD** directory (on the server). This contains the file **SETUP.EXE** which must be executed on every workstation (client). Through this setup the program icons will be created and the user specific files will be copied to the workstation.

Local Licensing

During setup you will be asked whether your hardlock resides locally or on the network server. Choose "**Local**".

- VPraster pro
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Network Licensing

During setup, you will be asked whether your hardlock resides locally or on the network server. Choose "**Network Server**". The next dialog prompts you for the name of the server bearing the hardlock ("dongle server"). You don't need to enter the two trailing backslashes "\\" (e.g. type only "SOFTELEC_DOMAIN").

If you don't know the name of the "dongle server" you may leave this entry empty and proceed with the installation. On startup **VP HybridCAD** will search the entire network for an appropriate VP license (e.g. a hardlock). However, this may take some time if your workstation participates in a large network.



In order to use Network Licensing the **VPLicenseManager** (see below), the hardlock driver, and the hardlock (dongle) must be installed on the same computer.

Registration

Fill out the attached registration form **completely** and **legibly** - best done during installation - and send it or fax it back to **softelec**.



You will receive technical support and update/upgrade notices provided you have properly registered **VP HybridCAD** software with softelec. Registration of **VP HybridCAD** products with your VAR or reseller does not constitute proper registration and will prevent you from obtaining software support or immediate upgrades (even those free of charge).

Uninstalling

To remove **VP HybridCAD** software from your computer, click on the icon **Uninstall**. If you have installed the same **VP HybridCAD** product twice without uninstalling the previous one, only the last VP installation will be removed.

The hardlock driver will not be removed. If the driver is not required by any other program, you can remove it from the **Driver** list in the **Control Panel**.



Updating / Upgrading / Patching

Software **upgrades** (to a higher level **VP HybridCAD** product) or **updates** (to a new release of the same **VP HybridCAD** product) may require a password that is issued to you upon purchase. After installing the upgrade or update and starting it for the first time, you will be asked to enter the password. After successful entry, the password can be discarded.

For updating a VP network license hardlock (the lock is attached to the VP server) use the program **UPDATELOCK.EXE** residing in the CD directory **VPHardlock**. For more information please read the text file ReadMe.TXT in the route directory of the CD.

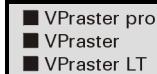
Free updates do not require a password, but it is important that you register your **VP HybridCAD** software for prompt notification.

Although you may update your current **VP HybridCAD** product by installing the new version into the same directory (patching), we recommend you do a fresh installation. First uninstall the old version, then install the new product version.

System Requirements

The **VP HybridCAD** software has been developed using the most powerful and state-of-the-art programming techniques specifically designed for high power PCs in order to be able to process the huge quantity of data of large images and technical drawings. However, proper operation requires a specific configuration of hardware and software to guarantee overall functionality. The fastest CPU in your PC is the most desirable!

VP HybridCAD software requires at least 32+ MB of RAM when running this application inside AutoCAD. Drawing formats of DIN A0 (E size) and larger, gray scale or color images of any size require a minimum of 64 MB RAM, 128 MB or more is recommended. File size and entity contents of a drawing define the actual amount of RAM required. **In general:** The larger and denser the drawing and the more recognition options are selected, the larger the amount of RAM required. Otherwise disk swapping will become necessary and will noticeably slow down program operations.



Installing the VPLicenseManager

The **VPLicenseManager** needs to be installed only if you have a computer network and the hardlock is attached to a remote computer ("dongle server"). This software controls and manages the **VP HybridCAD** licenses in the network.

Requirements

The **VPLicenseManager** may be installed as a **service** only on a Windows NT 4.0/2000 computer (server or workstation). It will not operate under Windows 95/98!

The software clients may run under Windows 95/98 or Windows NT 4.0 or higher. It is necessary that the clients have access to the "dongle server" (an account must exist for each user). We strongly recommend to install the **VPLicenseManager** on the Domain Controller Server!

Installation



For the following steps you must to be logged on to the dongle server as "**Administrator**"!

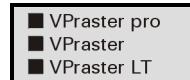
Follow these steps for installation:

1. Attach the Hardlock Module to the server's parallel port.
2. Install the Sentinel Driver from the **VP HybridCAD** CD (**[CDROM:]\\DRIVERS\\SENTINEL\\WIN_NT\\SETUPX86.EXE**).
3. From the **VPLicenseManager** directory on the **VP HybridCAD** CD run the following program:

VPLMSetup.exe

4. Reboot the server.

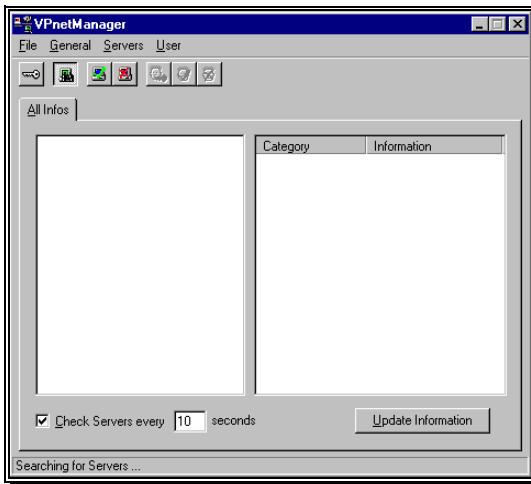
After rebooting the **VPLicenseManager** service is active.



Monitoring VPLicenseManager

Introduction

The **VPnetManager** application can be started on any computer operating under Windows 95/98 or Windows NT 4.0/2000. It monitors the activity of the **VPLicenseManager**. After the first start of the application, the following dialog appears:



The application automatically starts to search the network for **VPLicenseManager** Servers. The search may be stopped by selecting **Servers – Search Servers** (in the pull-down menu) or by clicking the icon once more.

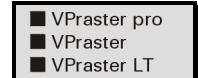
After the search has been completed the left window frame displays the symbols for an active **VPLicenseManager** server (with a **green** screen) and with a connected hardlock module:



If the search is stopped before a valid server has been found, a server can be manually added by selecting **Servers – Add Server** or clicking this icon and entering the network name of the server.



With **Servers – Remove Server** the currently selected server will be removed from the list.



A red screen indicates that the computer is not operating or the net path may be wrong.



The blue screen indicates that the computer is not a VPLicenseManager server.

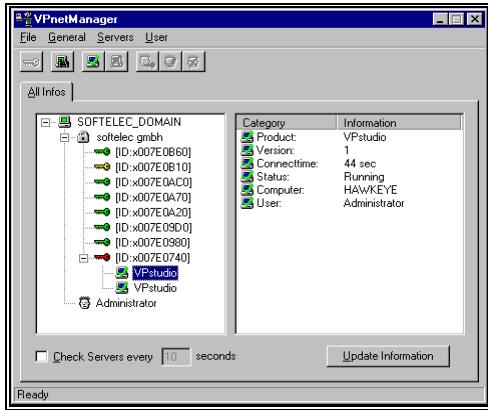


A yellow screen indicates that the computer is operating, but another error has occurred.



If the hardlock is not attached to the "dongle server" the symbol for the hardlock is missing.

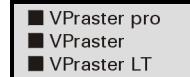
The following dialog box displays an active **VPLicenseManager** server on the computer SOFTELEC_DOMAIN with one hardlock module containing 8 product categories each marked by a key symbol. Each category may contain several licenses of that product. In this example there are currently two licenses of **VPstudio** in use. An Administrator is logged on to the **VPLicenseManager** server having access to one **VPstudio** license.



Menus

File

Exit: The program will be terminated. The server list will be saved automatically and will be available when starting the program once again. Quitting the program when no servers are listed the subsequent program start will invoke a new automatic server search.



General



Logon: This menu item is available if a server has been selected (by mouse click). After installing the **VPLicenseManager** only two users are defined:

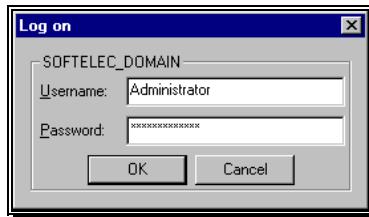
- User "**Administrator**" (password: Administrator; user type: Administrator)
- User "**MonitorUser**" (no password required; user type: MonitorUser).



With the first logon the Administrator's password should be changed immediately!

When starting the **VPnetManager** a "MonitorUser" will initially be used not assigned to a password, yet. That means any user having access to the program will be able to view all license information (except for information on other users logged on the **VPLicenseManager**), but he does not have rights for modifications.

If no other information, except for information on the servers shall be visible after starting the **VPnetManager**, the user "MonitorUser" must be deleted on the server. However, individual users may be provided with an account using a dedicated name and a password. The user status may either be "MonitorUser" or "Administrator".

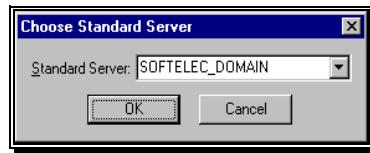


The user will be logged on to the server displayed. Note that the user name and the password entry are case sensitive! **VPnetManager** will attempt to log on the new user to any listed **VPLicenseManager** server. If this fails the user will be prompted to enter the password for a specific server.

Servers

Default Server: This menu item allows for assigning the **VPLicenseManager** server to a local workstation for providing a network license if available. Usually, the client will (after the first start-up) search the entire network environment for a **VPLicenseManager** server. If this fails, either by error or intention, this option allows for entering a requested server for providing a license authorization. If access to this server is denied, or all licenses are exploited the network will be searched continuously for any other available **VPLicenseManager** service.

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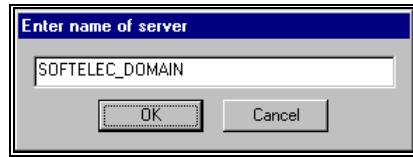
The server can be selected from the list of existing servers.



Search Servers: This function starts a new search for servers throughout the entire network. In general this will only become necessary if a new **VPLicenseManager** server has been added to the list and thus, cannot be displayed, yet. Alternatively, a server name can also be entered directly (**Server – Add Server**).



Add Server: The entered server is added to the list. It will be displayed in red if no **VPLicenseManager** server could be found on this computer.



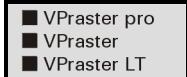
Remove Server: A selected server will be deleted from the list without any security challenge.

User

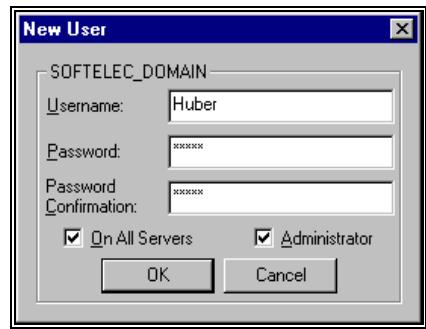


Change Password (registered users only): Changes a user's password. A "MonitorUser" may only change his own password.





Create (registered "Administrator" users only): Depending on the selected option a new user of the selected type, either of type "**Administrator**" or "**MonitorUser**" will be created. With the activated option **On All Servers** the system will try to newly register the user on all servers listed bearing his registration. The password default is the user name.



Delete (only registered "Administrator" users have access to this command):

A dialog box appears to delete users from the user list. All registered server users are displayed. Deletion will not invoke any security challenges.

Username	Server	Usertype
Administrator	HAWKEYE	Administrator
Huber	HAWKEYE	Monitor
Meier	HAWKEYE	Administrator
MonitorUser	HAWKEYE	Monitor

Section 3

Tutorial

This section applies to:

- VPraster pro
- VPraster
- VPraster LT

This tutorial has been designed to guide and teach you how to use the **VP HybridCAD** software products, including the **VP HybridCAD Demos**. We **strongly** recommend that you complete all of the tutorial exercises, otherwise you will not be able to appreciate **VP HybridCAD**'s editing and conversion capabilities. You will be guided step by step through all major command operations as well as setting up the program's parameters for optimum conversions. Please note that this tutorial will not detail every command or parameter settings. Detailed information on commands, settings, and processing procedures can be found in the following sections.

Latest information on updates and product news are also available on the **softtelec** web site at <http://www.softtelec.com>.

Getting Started

After installing the **VP HybridCAD** software, you will find the **VP** icon within the VP program group.



For full versions of VP HybridCAD software products only:

Any VP HybridCAD full version needs a valid license for execution.

For a **local operation** attach the **hardlock** (dongle) to the parallel port (male side!) of your computer. If a printer or other devices are connected to this port, the hardware lock should first be attached to the printer port followed by the printer cable.

For **network operation** the **VPLicenseManager** must be installed on the computer in the network where the **hardlock** (dongle) has been attached (for installation details see **Section 2**).

If a valid license cannot be found during startup, the following message will appear (sample: **VPraster**) and the software then operates in the **demo mode**:



■ VPraster pro
■ VPraster
■ VPraster LT

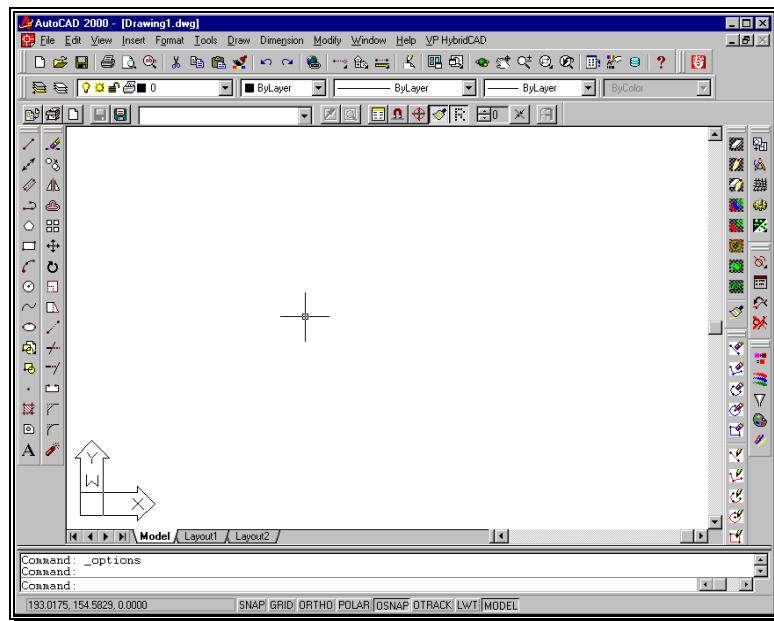


For VP HybridCAD Demos only:

A hardlock containing a license is not required. However, the maximum file size that can be edited using **VP HybridCAD** functions is limited to approx. 1800 x 1200 pixels. After importing a raster file larger than the limits and starting any VP command, a message appears asking for the positioning (mouse click) the center point of a window to be cut out of the image for further processing. This cut area can be fully processed with all **VP** commands including exporting to all supported formats.

Click the **VP icon** to start AutoCAD (AutoCAD LT) with the **VP HybridCAD** application. The AutoCAD main window appears including the **VP** menu entry and the **VP** toolbars depending on the installed **VP HybridCAD** software.

The sample below shows AutoCAD 2000 with **VPraster pro**:



Toolbars

The **VP HybridCAD** toolbars can be handled like the AutoCAD toolbars (except for the **VPraster tools** toolbar). Additional, removed **VP HybridCAD** toolbars can be reactivated with menu commands: From the **VP HybridCAD** main menu open the submenu **Show Toolbars**. A list of all **VP HybridCAD** toolbars is displayed – select the toolbar you want to reactivate.



Move Toolbars

To move a toolbar into a new position, click and hold the left mouse button on the edge of the toolbar. Now drag the toolbar to any position on the screen. When releasing the mouse button the bar will be set to this position.

The bar will appear as a separate window bearing a title bar when placed in the workspace. When placed on the upper, left, right, or lower frame it will be added to the toolbar space.

Using VP HybridCAD commands

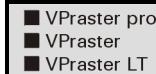
There are three possibilities to call a **VP HybridCAD** function:

1. **The VP HybridCAD Menu:** This menu contains all **VP HybridCAD** commands.
2. **VP toolbars:** Most of the **VP HybridCAD** functions can be activated by clicking the corresponding icon of a **VP** toolbar. Some toolbars are designed in flyout style, i.e. you can only see one icon of this toolbar (the last selected) at a time.
3. **Command line:** Each **VP HybridCAD** function can be called via command line input. Each **VP HybridCAD** command always starts with the characters **vpr....**

AutoCAD LT 97/98/2000

There are **no** limitations in functionality for **VP HybridCAD** running with AutoCAD LT 97/98/2000. Only the command line operation implies some special requirements:

- A special command must precede the **VP HybridCAD** command:
image when using **AutoCAD LT 97/98**
vprlt when using **AutoCAD LT 2000**
- After this command enter a space and the **VP HybridCAD** command, e.g.
image vprLoad or
vprlt vprLoad, respectively
- The **[Enter]** key for repeating the last command will not work with most of the **VP HybridCAD** functions.



Lesson One: First Steps

During this lesson you will learn how to

- *load/save a raster file,*
- *edit the whole raster image (raster file),*
- *edit parts of the raster image,*
- *export the image to a raster file raster.*

Loading and Saving the Raster File ARCH.CG4

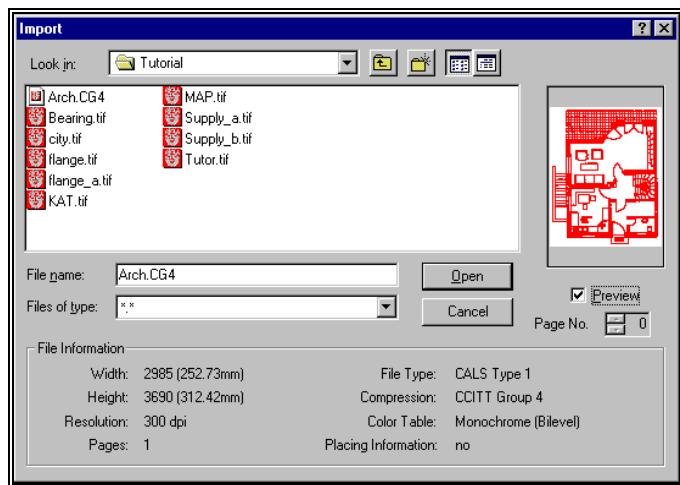
Loading a Raster File

VP HybridCAD provides a special interface for loading raster files in addition to the AutoCAD native functions. For the consecutive raster editing it doesn't matter which interface you use. Depending on the raster file format used, some raster files can only be read with either **VP HybridCAD** or with AutoCAD (see also **Specifications**).

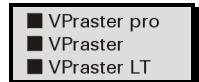
If you are running **AutoCAD LT 97/98/2000** you can only load raster files using the **VP HybridCAD** interface.



Create a new drawing. To open the **VP HybridCAD** dialog click on the icon **Load Raster Image** (command line: **vprload**). In the dialog box browse to VP's subdirectory **TUTORIAL**. Select the file **ARCH.CG4** and click **Open**.



The raster image is displayed in the AutoCAD workspace at position **0, 0, 0**.



Saving a Raster File

VP HybridCAD offers three different ways to save a raster image:

AutoCAD Save: The AutoCAD command **SAVE** or **SAVEAS** creates a DWG-file (or saves changes to an existing file) which includes one or several links to the raster files in use. The menu command **Insert – Raster Images** displays a list of all raster images, including name and path of the corresponding raster file. If you have created a new raster image or modified an existing raster file with **VP HybridCAD** you will be asked for a file name to also save (export) the new or modified image to a file.

VP HybridCAD Save: This command allows you to select the raster image you want to save (export) into a raster file. The raster data is saved to a raster file specified in the **Save** dialog. You can select different raster file formats.

RasterDWG: This command creates a DWG file containing all vector entities **and** raster data in **one file**. The path of any previously inserted raster image will be deleted.



We will use the **RasterDWG** format: From the **VP HybridCAD** menu select **Save as RasterDWG** or click this icon (command line: **vpr saver dwg**). Save the file as **ARCH_1.DWG**.

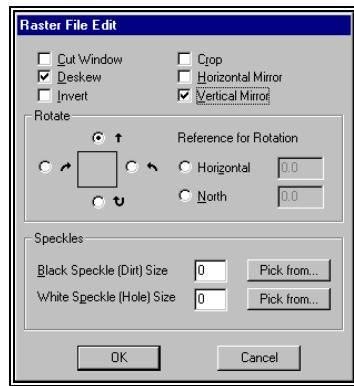
Editing the Raster File

Now, the Active Image (= raster file) is going to be vertically mirrored and deskewed.

Deskew and Mirror – Method 1



Click the icon **Raster File Edit All** (command line: **vprrfe**). The dialog box **Raster File Edit** appears offering several editing options.



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Please, mark **Deskew** and **Vertical Mirror** and click **OK**.

Next, a reference line has to be defined to deskew the drawing accordingly. In the workspace the **mouse cursor** appears as a triple **frame box** to indicate a zoom action with the next mouse click.



Click on the lower right corner of the floor plan. The area around the **frame box** will be zoomed in. If active, disable the raster snap by clicking the **Raster Snap** icon (command line: **vprsnap**). Now, mark the starting point of the reference line by clicking in the center of the corner. The **frame box** reappears with the reference line's free end attached to it. The program automatically zooms out to the general view. Click on the upper right corner and mark the end point of the reference line in the center of this corner.

The edit process (**deskewing** and **mirroring**) starts immediately. The image will be mirrored and deskewed.

Deskew and Mirror – Method 2

For cleaning the raster file (despeckling) and deskewing you may use the function **Auto Cleanup** instead.



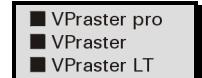
Again, **Open** the same original file and click on **Auto Cleanup**. The raster data are automatically despeckled and deskewed. Speckles which could be dots (e.g. parts of decimal numbers) or small lines from dashed lines etc. remain unerased.



To finally mirror the file click on this icon and select **Vertical Mirror** or select the function **Vertical Mirror** from the flyout.

Scaling

The raster image is going to be scaled to fit to AutoCAD units. At this time, only the display of the raster image will be scaled – not the raster file itself. Therefore, we will use the AutoCAD scale command.



By measuring the kitchen's width and length and by comparing the results with the given floor space we found that the floor plan has to be scaled as follows:

Metric: 3.9

English: 100



Start the scaling by clicking the **Scale** icon of AutoCAD's **Modify** toolbar. In the command line you are asked to select objects: click with the cursor on the frame of the raster image – if selected, it will appear with a hatch. Press **[Enter]** to end the selection mode. Now you are asked for the base point – enter **0, 0** in the command line. The last parameter you are asked for is the scale factor – enter **3.9** or **100** depending on your system setup.

After the image has been scaled, you can check the results by repeated measuring. The kitchen's width should be **340**, its length **400** units.



To save the current status, use the AutoCAD's **Save** function. This command keeps the current file format so that the RDWG file **ARCH_1.DWG** will be updated.

Editing the Raster Image

Deleting, Moving, and Copying Raster

The bathroom installation in the upper right part of the floor plan is going to be rearranged: the toilet and the wash basin will be removed and vectors from a library element will be inserted.

Deleting Raster Elements



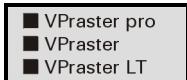
Zoom in to the bathroom and click the function **Erase Raster** (command line: **vprerase**). The toolbar **Raster Selection** appears in the workspace for choosing the appropriate selection method. Select the mode **Select Rectangle** and drag a window around the toilet. The selected raster structure appears **green**.



If you have accidentally erased more than necessary, use the AutoCAD command **Undo**. This command is applicable on most of the **VP HybridCAD** commands.



For selecting the wash basin, use the selection mode **Select Polygon**. Draw a polygon around the wash basin. Do not accidentally select parts of the wall where the wash basin is attached. Close the polygon with a right mouse click or with **[Enter]**.



After you selected all necessary raster entities to be removed from the image, press **[Enter]**. The selected entities are deleted.

Save the changes to **ARCH_1.DWG**.

Inserting and Rasterizing Vector Entities

From a library, three additional elements for the bathroom are going to be inserted.



Start the AutoCAD command **Insert Block**, click **File**, and select the file **SHOWER1.DWG** from the **TUTORIAL** directory. Insert this block at the upper right corner of the bathroom. Keep the scaling and the angle of the block (X scale factor = Y scale factor = **1.0**, rotation = **0.0**).

Insert another block: **WC1.DWG**. Place the block at the left wall of the bathroom, keep the scaling (X scale factor = Y scale factor = **1.0**), but rotate the block by **90** degrees. When you are done you may have to correct the position of the block – move it to the wall.



It may occur that while working on the second block the first one disappears: it is hidden by the raster. In this case just click **Regenerate** (command line: **vprtoback**) to restore the original drawing order.

Insert a third block: **WB1.DWG** and attach the block to the lower wall next to the door (scaling: X scale factor = Y scale factor = **1.0**, rotation = **0.0**). Insert the same block again right next to the previous block.



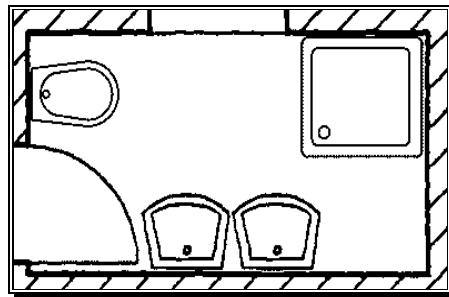
To convert the inserted vector entities into the raster they have to be rasterized. Click the icon **Rasterize Entities** (command line: **vprplot**). The dialog box **Rasterize** opens. All vector elements should be rasterized and thereafter deleted. Select **Rasterize only Vector Objects**, **All**, and **Delete Objects after Rasterization**.



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| ■ VPraster pro |
| ■ VPraster |
| ■ VPraster LT |

Close the Dialog with **OK**. The next dialog box displays the line width for rasterization, depending on the color of the entity. Click **OK** to accept the settings and to start the rasterizing. This will take some time, depending on the speed of your computer.

The editing results should look like this:



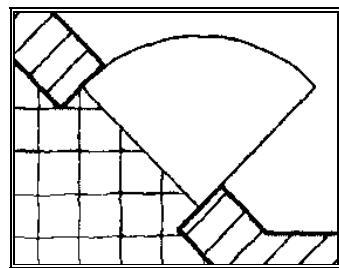
Save the changes to **ARCH_1.DWG**.

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| ■ VPraster pro |
| ■ VPraster |
| ■ VPraster LT |

Erase and Draw Raster Tools

The door to the patio in the lower part of the floor plan is going to be replaced by a wall. For this, we will use VP HybridCAD's raster erase and draw tools.

Zoom to the door in the lower part of the raster image:



Erasing the old raster section



Activate **Dynamic Width** (Command line: **vprpickwidth**) to enable an automatic assignment of the line width while drawing or erasing raster structures.



Activate the **Erase Line** function by clicking this icon (command line: **vpreline**). With this command you specify a raster line that will be erased immediately. Set the first point of the line on the door wing at top right and the second point on the corner of the wall. The specified raster is erased. End the function (right mouse button or **[Esc]**).

Proceed in the same way with the raster line representing the closed door and the line of the wall opposite of those already erased.

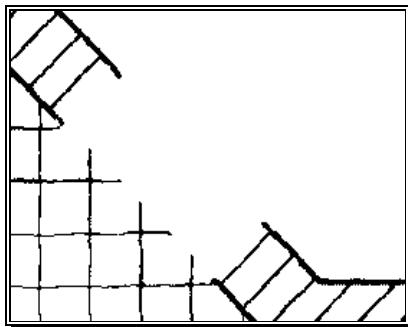


For the remaining raster line of the door start the **Erase Arc** function (command line: **vprearc**). Set the start point of the erase arc at one end of the raster arc, the second point to the middle of the arc, and the end point at the end of the arc.



To erase part of the tiles use the function **Erase Raster** (command line: **vprerase**) and **Select Polygon**. Draw the area to be erased with the polygon (to close the polygon press **[Enter]**). Press **[Enter]** again for execution.

The raster is now prepared for further modifications:



Drawing new raster elements

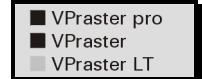


First, close the gap in the wall. Click the icon **Draw Line** (command line: **vprdline**). The line you draw will be rasterized immediately into the raster image. The line should have the same width as the border of the wall, therefore click the icon **Dynamic width** (command line: **vprpickwidth**). With this option the width of the raster at the start point is used to set the line width.

Click on the border line in one part of the wall and draw the line to the other part.



To avoid wrong width measurements select the start point of the draw line carefully: avoid raster junctions or holes.



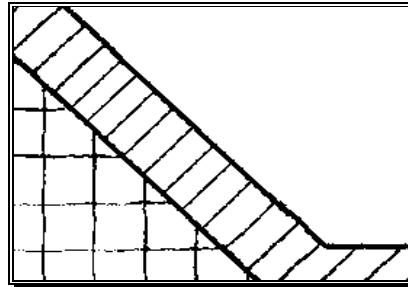
Setting the second point the line will be rasterized. End the function and close the gap in the other wall border.

For a hatch of the wall deactivate the **Dynamic Width** option and instead, set the **Pen Width** to **4 pixels**:



Draw the hatch lines with the same spacing as those already included in the raster image. For experienced user: You can also copy a part of the existing wall (use polygon select) instead of drawing new raster lines.

The result of this editing should look like this:



Save the changes to **ARCH_1.DWG**.

Scaling and saving (exporting) the modified raster data.



The scaling set up for this lesson only affected the display in AutoCAD. To make the scaling permanent, e.g. in the raster file, we use a **VP HybridCAD** command. From the flyout toolbar **Raster File Edit** select the icon **Scale Raster Image** to open the dialog box **Scale Drawing** (command line: **vprscale**). Select the isotropic scaling with the parameter

1.0 = 3.9 or 100

depending on your system setup and click **OK** to start the scaling.



Start the function **Save Raster Image** (command line: **vprsave**). You are asked to select the raster image to be saved (exported): click on the border of the floor plan. A save dialog opens – enter **ARCH2** as raster file name and select **TIFF** as file type. Click **OK** to save the raster.

Lesson Two: I. Raster Objects

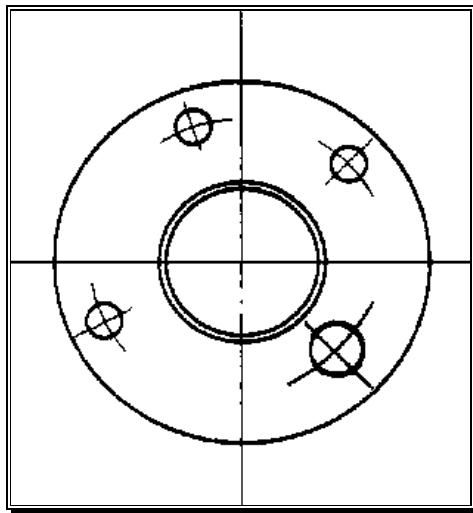
The raster object functions provide the tools for editing even complex raster layouts. They enable copy and cut functions for parts of the raster, which can be edited later (using the move, rotate, scale, and delete commands). During this lesson you will learn how to

- *cut and copy raster objects,*
- *paste raster objects from files.*

Preparation



Start with a new drawing and load the raster file **FLANGE.TIF** from the **TUTORIAL** directory:



Save the drawing with the attached raster file using the AutoCAD command **Save as** (command line: **SAVEAS**) as **FLANGE_1.DWG**, the raster file as **FLANGE_1.TIF**.

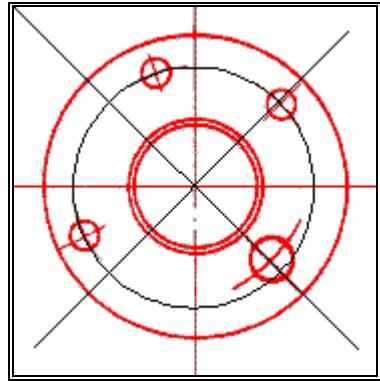
The raster drawing will be edited in two steps: First the drillings will be corrected, followed by adding another raster from a second file.

<input checked="" type="checkbox"/>	VPraster pro
<input type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Drawing Construction Lines



Switch off the **Erase Raster Background** mode if it is still active (command line: **vprerasebg**). Draw two diagonal vector lines and a circle:



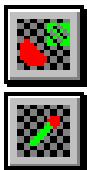
Turn on AutoCAD's **Ortho** mode and activate AutoCAD's **Line** function. Draw a horizontal and a vertical line near the raster center lines in the image. It does not matter if you don't place the lines exactly. This will be done with the next step. Turn off the **Ortho** mode and select the two vectors. Start the AutoCAD **Move** function and set the **Base Point** to the intersection of the two vector lines. Drag this point on the intersection of the two raster lines and place the vectors there. Select the two vectors again and activate AutoCAD's **Rotate** function. Set the **Base Point** on the intersection of the vectors and enter **45** degrees as rotation angle.



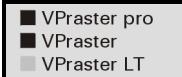
Select AutoCAD's **Circle** function. Set the circle's center point to the drawing's center and increase the radius until the circle runs through the upper right drilling.

Selecting and Moving Raster

The upper left drilling is to be deskewed to the construction lines.

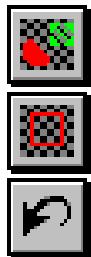


Zoom in to the left upper drilling and click the icon **Move Raster** (command line: **vprmove**). The toolbar **Raster Selection** appears inside the workspace. Since this drilling consists of an isolated raster element without connections to the rest of the drawing, you can use the **Pick Element** for selection. Click anywhere on the drilling element and it turns to the color **green**. Since there are no parts missing in the move, click [**Enter**].



Select the raster object and move it to the desired position using AutoCAD's **Move** function: Click on the crossing point of the two circle center lines. The object is now attached to the cursor. Move it onto the intersection of the construction lines (circle and line). Do **not** press the left mouse key (otherwise the object would be immediately inserted into the image). Instead enter **angle** into the command line. Now you can rotate the object around the selected base point – deskew the object according to the construction lines. Then, click with the left mouse key for confirmation of the rotation and click again to end the move command. The object will be inserted at the new position.

Now, the lower left drilling is to be deskewed to the construction lines.



Again, zoom in to this area and click **Move Raster**. Since the drilling is connected to the outer circle a different selection method must be used to select the drilling only. **Select Inside Window** is the appropriate selection method. Drag a window around the drilling in a way that all raster parts of the drilling to be selected are inside the window. Since the outer circle exceeds the window, it will not be selected. If the drilling was not completely selected, **Undo** (with the AutoCAD command) the selection and try again.

When the drilling is fully selected, (**green**), confirms the selection and position the raster object at the new position. Use moving the object center to the center of the drilling.

Deleting Raster Objects

The lower right drilling indicates a wrong diameter. It will be deleted and replaced by a raster object.



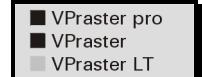
Zoom in to the lower right drilling and click on **Erase Raster**. Use either **Pick Element** or **Select Inside Window** for selection. If all of the drilling to be removed has been selected, (**red**) confirm selection and the selected raster is deleted.

Copying Raster Objects

The upper right drilling is to be copied, rotated and placed at the correct position in the lower right sector.

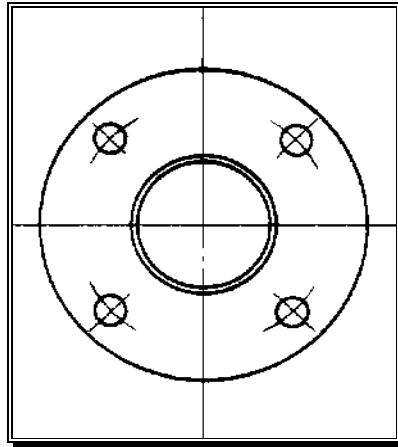


Zoom in to the upper right drilling and click on **Copy Raster** (command line **vprcopy**). Select **Pick Element** and click with the pipette on the drilling. Confirm the selection and move the raster object to the lower right sector and position it with its drilling center on the crossing of the construction line with the circle. Rotate the object 90° using **[Shift]** while rotating. Confirm the final position (right mouse key).



Delete Construction Lines

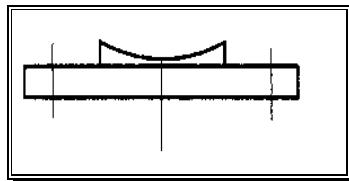
The construction line are no longer needed. Select these vector elements and delete them. When completed successfully, the raster drawing should look like this:



Pasting Raster from a File



Load the raster file **FLANGE_A.TIF** from the **TUTORIAL** directory. This file provides a raster object that will be added to the bottom and top of the current drawing.

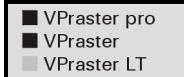


Copy the raster image with the AutoCAD copy command and place the copy in the upper part of the drawing. Rotate the raster by **180** degrees, position it at the top edge of the component, and adjust it to the center line.

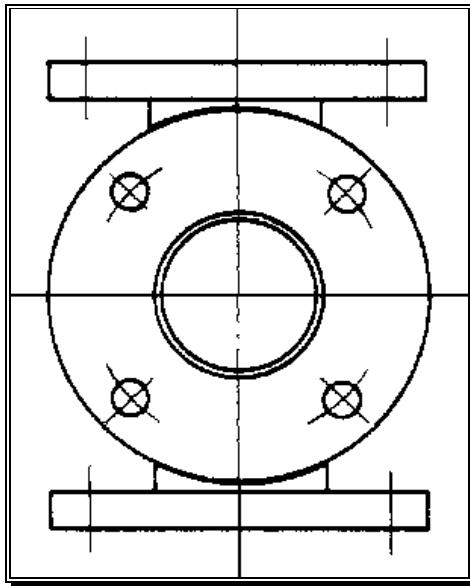
Select the lower raster image and move it to the bottom edge of the component just the way you did with the first object.



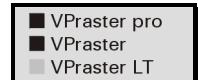
Execute the rasterization process with the default settings (**Rasterize only Vector Objects, All**, and **Delete Objects after Rasterization**).



In its final design the edited component should look like this:



Lesson Two: II. Raster Objects – complex Editing



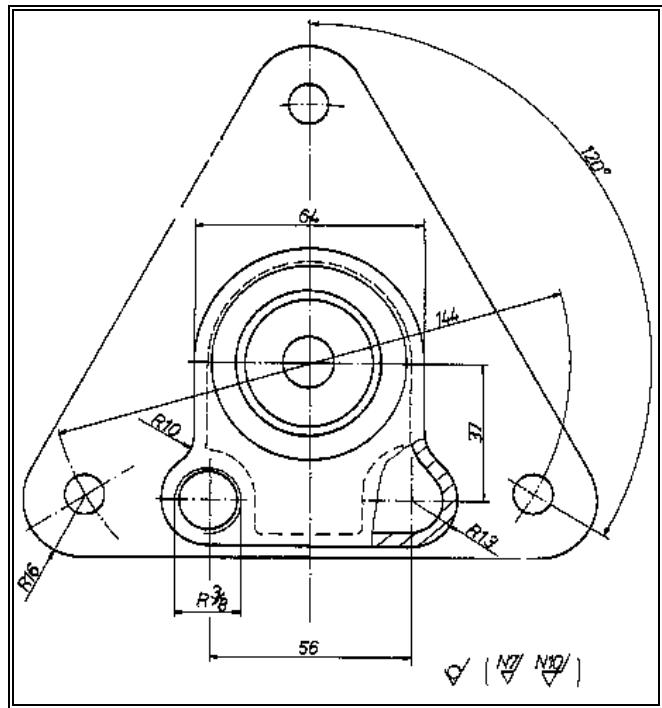
During this lesson you will learn how to

- edit complex raster structures,
- modify raster text.

Preparation



Start with a new drawing and import the raster file **BEARING.TIF** from the **TUTORIAL** directory:

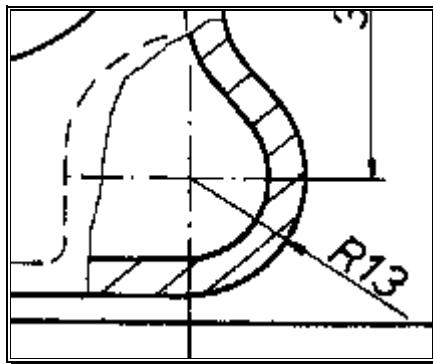


Erase Raster

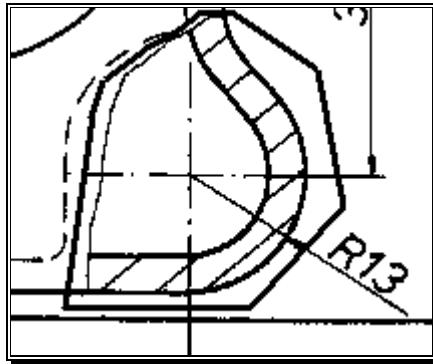
Select Raster

The hatch and lines of the cut section in the drawing at the lower right will be erased. The center lines of the circle should remain.

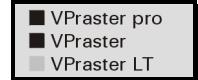
Zoom in to the lower right section.



Click on the **Raster Erase** icon (command line: **vprerase**) and select the mode **Select Polygon**. Draw a polygon around the area to be modified:



Close the polygon (right mouse click or **[Enter]**). All the raster inside the polygon is selected (**red**).



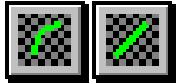
Deselect Selected Raster Structures

Since not all of the selected raster should be erased, some raster entities have to be deselected.

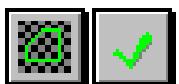


Click on **Select Line** and keep the **[Ctrl]** key pressed whenever you want to deselect previously selected raster entities. Draw a horizontal line on top of the horizontal circle center line. Start and end outside the polygon, e.g. on the white part of the horizontal raster line.

The horizontal circle center line is all red again, i.e. deselected. Deselect the vertical circle center line the same way.

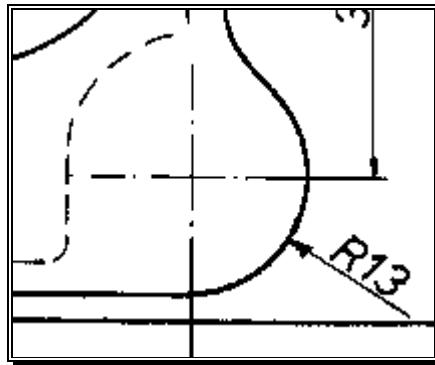


Now, deselect the outer contour line of the component. Use the selection modes **Select Arc** and **Select Line**. Since the de-selection cannot be completed in one step, repeat the selection until all parts of the contour are deselected.



For de-selection of the arrow use the **Select Polygon** command.

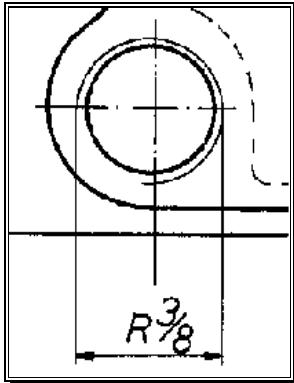
Accept the final (remaining) selection (**[Enter]**). The area should look like this:



Create Raster Object

The drilling at the lower left including the accordingly dimensioning will be newly deskewed to the circle center lines. A copy of this part will be placed on the previously (see above) edited area.

Zoom in to the following area:



Select Raster



Click the **Create Raster Object (Erase Background)** icon (command line: **vpreobject**). Select with the appropriate selection commands the circle, the arc and both the vertical dimension help lines (**Select Circle**, **Select Arc**, **Select Line**).



For the dimensioning section (line, arrows, and text) use **Select Window** for selection. Drag a window around these entities and everything inside the window will be selected. Therefore, make the window as small as possible.

End the selection ([**Enter**]).

Move Raster Object

For an optimal positioning we will set the object insertion point to the center of the drilling circle.



We will use the raster snap to locate the center point. Click on the icon **Change Settings**, activate the **Raster Snap** function and select the snap modes **Center** and **Crossing**. Close the dialog with **OK**.



Select the raster object and click on the AutoCAD function **Move**. Activate the **Raster Snap** and move the cursor towards the raster circle line until the raster snap displays the circle center snap (with a little color circle). If you now click with the mouse, then the base point for moving the object will be the center of the circle. If no little circle appears, then your snap mode is set to **Crossing**. Press [**Tab**] to change to **Center**.

<input checked="" type="checkbox"/>	VPraster pro
<input type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Since the raster snap operates only on the topmost raster image, we will first insert the object into the area previously erased (to the right).

Again we will use the **Raster Snap** function. Move the raster object to the right until the cursor is in the area of the crossing of the two construction lines. Change with **[Tab]** to the snap mode **Crossing**. A colored cross indicates the snap point – click with the left mouse key to insert the object.

Copy Raster

The previously moved raster object will be copied and inserted to the left.



Copy the raster object with the corresponding AutoCAD command. Position the base point with the help of raster snap mode **Center** into the center of the drilling hole.

Follow the same procedure: Move the raster object to the left and insert it with raster snap mode **Crossing** on the crossing of the two circle center lines.

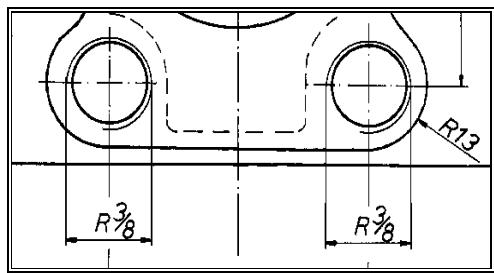


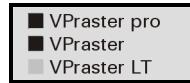
Execute **Rasterizing** with standard setting in order to merge the raster objects with the raster image.



The dimensioning text is crossed by a vertical line. Erase the part of that line interfering with the text using the function **Erase Raster** and selection mode **Select Line**.

The edited part should look like this:





Edit Raster Text

We will modify some of the dimensioning numbers.

The procedure is as follows: First, select the text with a rectangle (2-Point for horizontal or vertical text, or 3-Point for text at any angle). This rectangle also defines the area of deletion in the current image. Then, edit the text in the dialog box; on **OK** the rectangle area will be erased and the new text rasterized.



Zoom in to the dimension text **56** at the lower area of the drawing and start the function **Draw Text** (command line: **vprdtext**). Since this is a horizontal text use the 2-Point rectangle (default). Drag the rectangle around the text starting at the lower left corner.

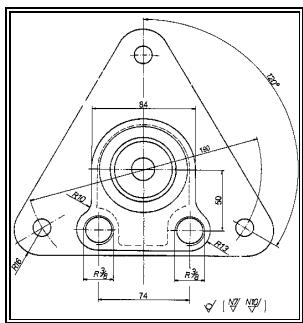
The dialog **Edit Raster Text** opens, displaying the selected area with the raster text (rotated if necessary, so that the text appears horizontal) and its OCR interpretation. Modify the text to **74** and activate the option **Show Text before Rasterizing**. This option allows to move, position, and scale the text after the dialog has been closed with **OK**. The new text is placed as a raster object on top of the original text (now erased). Click the right mouse key to confirm the final position; then the new text appears in the drawing.

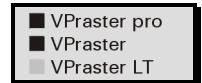
The same way modify the following dimensioning numbers:

Original no.	New no.
56	74
64	84
144	190
37	50

With some of the text strings having an angle you need to select them with a 3-Point rectangle: Before clicking, choose the **Window** option from the command line, then click in the lower left corner of the text. The second click specifies the angle and width of the text (lower right corner); the third click defines the text height (upper right corner).

At the end the completed drawing looks like this:





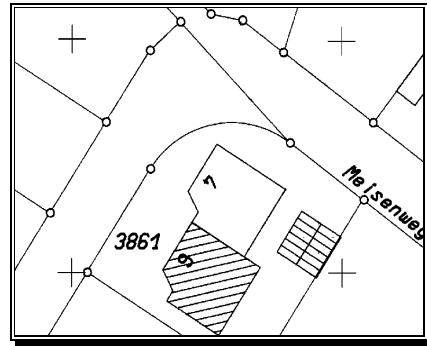
Lesson Three: Merging two Raster Files

During this lesson you will learn how to merge two raster files to form a new one.

Loading the First Raster File



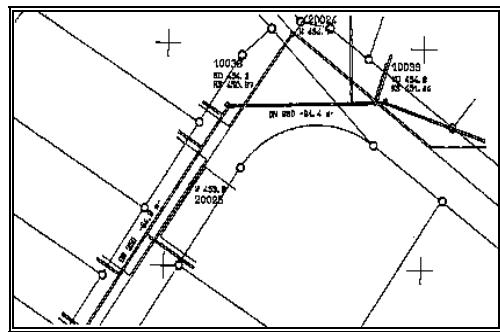
Start with a new drawing and load the raster file **SUPPLY_A.TIF** from the **TUTORIAL** directory.



Loading and Editing the Second Raster File



To load the second raster file click the **Merge Raster Images** icon (command line: **vprmerge**). Choose the file **SUPPLY_B.TIF** in the **TUTORIAL** directory from the **Import** dialog box.



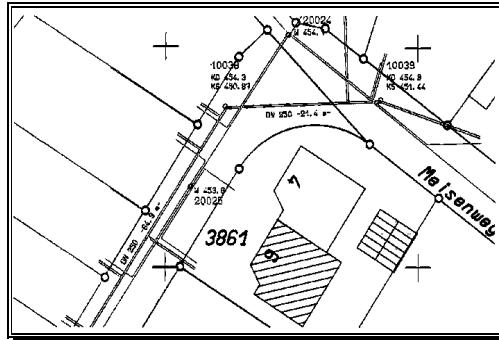
The dialog box **Adjust Object/Merge** appears. The raster can be **moved**, **rotated**, and **scaled**. Choose **Fit** and click **OK** - the cursor appears as a **frame box** in the workspace, as in the deskew operation learned earlier.

Now, you must specify a first pick point: place the **frame box** cursor at the upper left reference cross of the last inserted raster and click on the left mouse button. The program zooms in to this position while the cursor changes into a **crosshair** display. Specify the first merge point of the image to be moved by clicking on the cross-center. The first raster image will be zoomed out and the frame box cursor reappears with a "rubber band" line. (Clicking on the **right** mouse button will undo your last step). Proceed in the same manner, as described above, to specify the second end point of the line. Specifically choose the upper left cross.

The raster will be re-positioned according to the moving vector. Next, you must determine rotation and scaling factors. Proceed as described above. Place the second vector's starting point on the lower right cross of the last inserted raster object whereas the end point should be placed on the raster lower right cross.

After entering the points, rotation and scaling processes will be executed while the cursor changes to **OK** (if you now click on the **right** mouse button you can enter two new points for another rotation or scaling process). Click on the **left** mouse button to confirm your previous action and to execute rasterization.

Since the second raster had been loaded with the raster **Merge** function the drawing size now has been changed and adjusted to the new raster drawing you have generated. The result should look like this:



Save the raster as **SUPPLY_1.TIF** to the **TUTORIAL** directory.



■ VPraster pro
■ VPraster
■ VPraster LT

Lesson Four: Rubber Sheeting

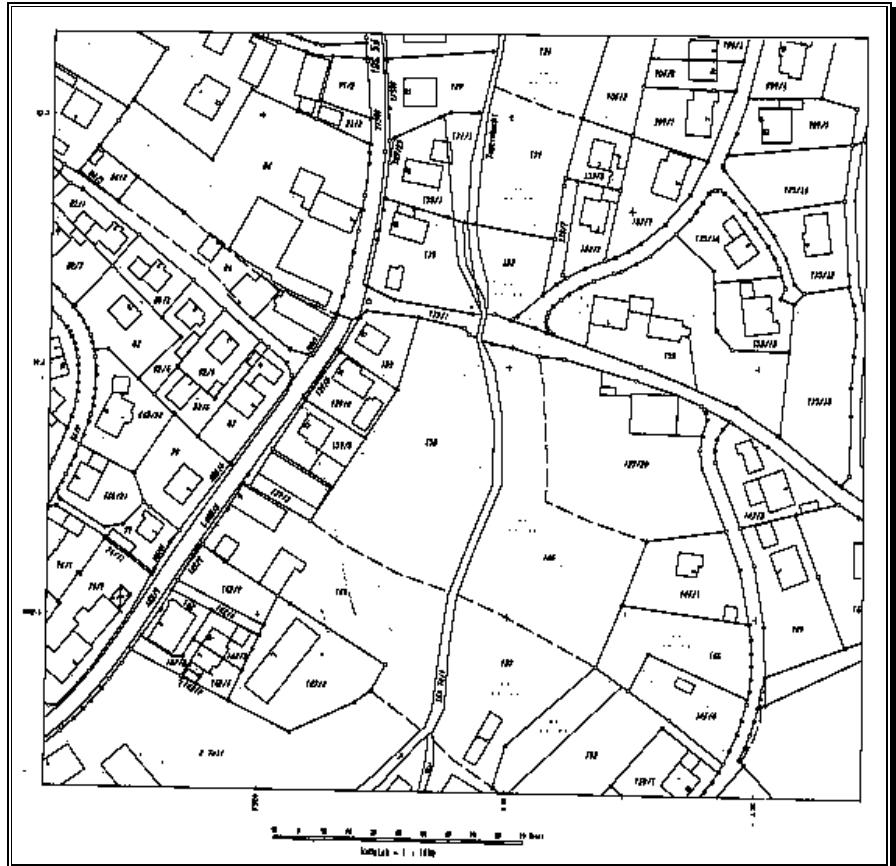
During this lesson you will learn how to

- *rubber sheet a raster image by using the multi point method,*
- *enter reference points with and without grid snap.*

Preparation



Start with a new drawing with **Metric** default settings and load the raster file **MAP.TIF** from the **TUTORIAL** directory.

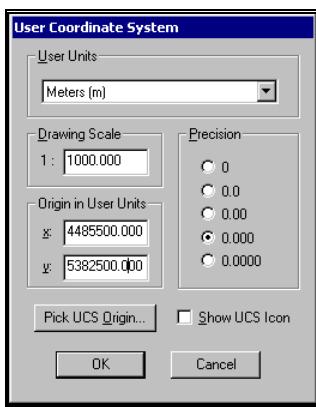


Settings

The map is to be rubber sheeted in a way that the coordinates of the reference points correspond with the map's details.



In the menu **VP HybridCAD** call the sub menu **Rubber Sheeting** and select the function **General (Multi Point)** (command line: **vprrubber**). You are asked to set up the coordinate system. In the **User Coordinate System** dialog box



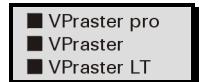
set the **User Units** to **Meter** since this map has been drawn in Gauss-Krueger coordinates. Set the **Drawing Scale** to **1:1000** as indicated on the map. The lower left reference point on the map will serve as the **Origin**: enter **4485500** for the **x value** and **5382500** for the **y value**.

Click on **Pick UCS Origin**. Zoom in to the respective reference point (on the lower left of the drawing) and click on the center of the raster cross point. The origin is specified.

Accept all other settings in this dialog box with **OK**.

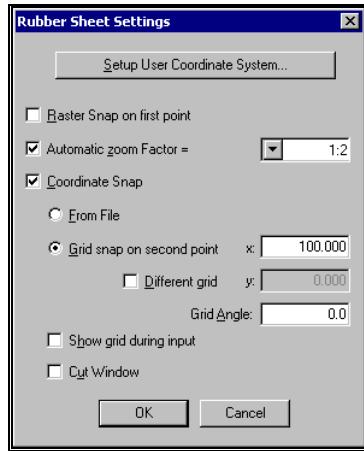
Entering of Reference Points

Next, you will be asked for drawing aids. The current raster map contains reference points which are structured in a grid. The distance between each point is 100 m.



Entering with Grid Snap

The grid structure of the points in our example prompts for using the 'grid snap on second point' method first. In the **Rubber Sheet Settings** dialog box



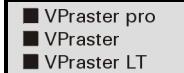
mark the options **Grid Snap on second point** (set the grid distance to **100.00**) and **Automatic zoom Factor** = (set factor to **1:2**). Click **OK**.

The main dialog box **Rubber Sheeting** opens.

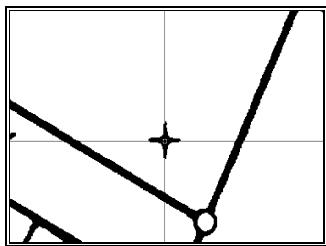


Since **Grid Snap** has been chosen a grid will be overlaying the whole raster image with the specified spacing. This grid correlates with the origin. At the grid's line intersections the reference points are expected. At this stage of processing the grid is visible and can easily be modified, e.g. if you see that the grid distance does not match with the raster image's reference points just click on **Grid/UCS** and adjust the grid settings.

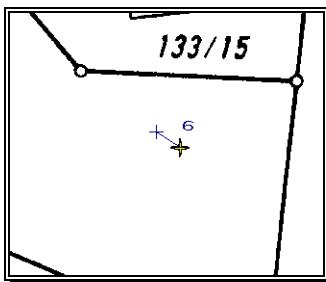
Now activate the **Input Points** option to start entering reference points. The grid display will be switched off for a better view of the raster while the grid's functional significance is still active.



The program will zoom to the first grid point on the lower left. Click on the center of the cross point.



After clicking the first reference point the next grid point will be zoomed in. The grid points are addressed from left to right and from bottom to top. Proceed the same way for all remaining reference points. The points you enter will be numbered. The **target values** (grid points) will be indicated as green crosses while the entered **actual values** will be displayed as blue crosses. The deviation between both values is shown by a green line. In the case that a residual error remains after the rubber sheeting process the actual value's new position will be indicated as a yellow cross. In detail this will look like this, e.g. for reference point no. 6:

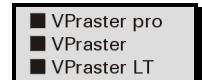


Depending on the number and position of reference points you have entered the highest transformation function (rubber sheeting function) possible will be selected automatically - in our example the **Quadratic** function is chosen.

Entering without Grid Snap

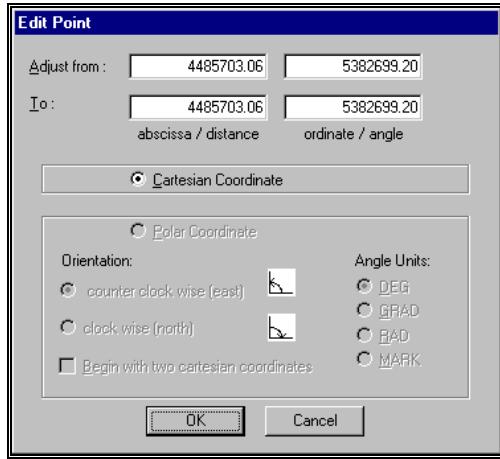


Maps which do not contain reference points in a grid structure require the entering of points without the grid snap option. We'll demonstrate this method with our sample map. First, delete all points you have already entered. Click the button **Delete Point** in the **Rubber Sheeting** dialog box repeatedly to delete all entries from the reference point list. Then click the AutoCAD icon **Redraw All** to redraw the raster.



Open the **Rubber Sheet Settings** dialog box with **Grid/UCS** Switch off the **Grid Snap on second point** function and confirm with **OK**. The cursor changes to a frame box.

Now, click on the upper right reference point. The point will be zoomed in according to the previous zoom settings. Place the cursor into the center of that point (Cross) and click. The **Edit Point** dialog box opens:



It shows the point's **actual value** and the **target value**. For the **target value** enter **4485700** as **x value** and **5382700** as **y value**. Confirm with **OK**. Proceed with entering more reference points:

upper left: **x = 4485500 y = 5382700**

lower left: **x = 4485500 y = 5382500**

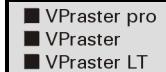
lower right: **x = 4485700 y = 5382500**

center: **x = 4485600 y = 5382600**

Just like working with a grid snap the transformation function will change depending on the number of points you have entered - since you have entered fewer points now only the **Linear** function is selected.



To rubber sheet a map accurately you have to enter a sufficient number of points. On the other hand these points should have some distance between each other so that their x and y values differ considerably. If that is not the case, a warning message appears and/or a lower class function is selected.

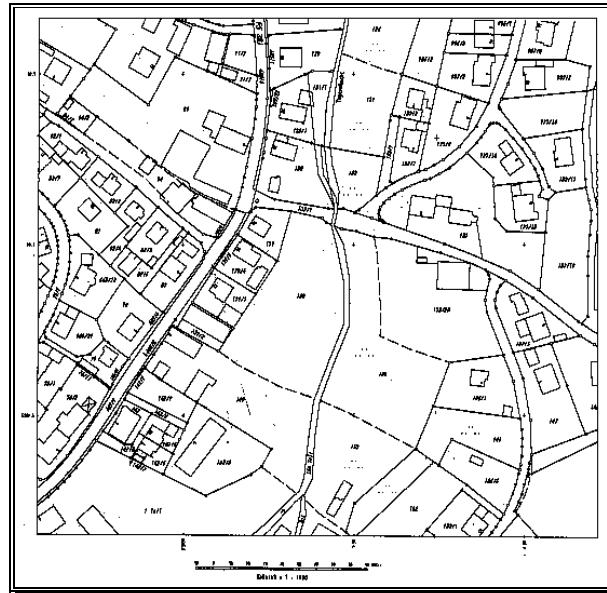


Editing Reference Points

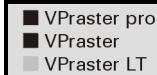
You can edit individual points by highlighting the respective point in the selection listing and clicking on **Edit Point**. The point will be zoomed in and you can modify the **target value** in the **Edit Point** dialog box.

Rubber Sheeting

Click **OK** to start the rubber sheeting process - this will take a few seconds. When rubber sheeting is completed you can review the reference points on the image: The values displayed now correspond with the map's coordinates.



Close the **Rubber Sheeting** dialog box with **OK** and save the raster file as **MAP_1.TIF**. The raster map is now prepared for further processing.



Lesson Five: Tracing (Line Following)

In a raster drawing only certain lines are going to be vectorized. The following steps are necessary:

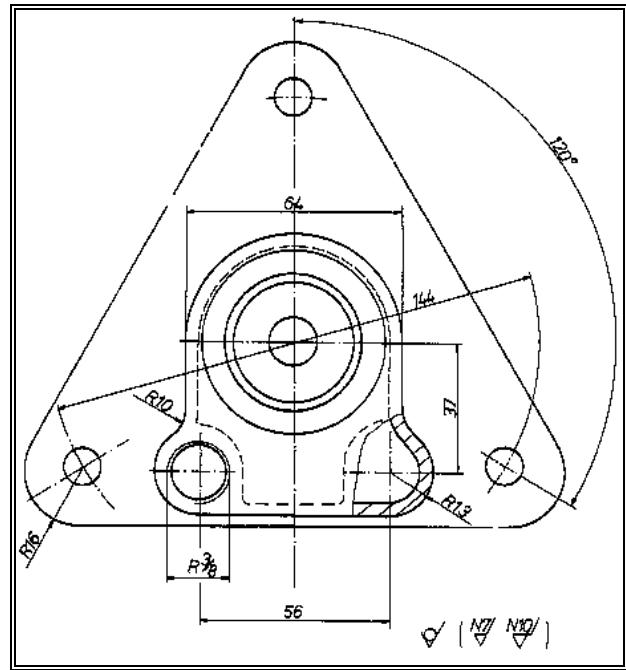
- *tracing contours,*
- *tracing CAD elements.*

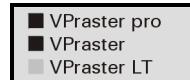
Tracing of Lines and Export of Generated Vectors

Preparation



Start with a new drawing and load the raster file **BEARING.TIF** from the **TUTORIAL** directory.

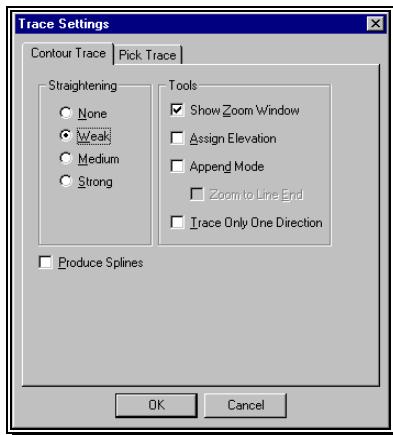




Settings



Click the **Trace Settings** icon (command line: **vprstrace**) to open the respective dialog box. Click on the tab **Contour Trace** and set the **Straightening** option to **Weak**. You can experiment with these values later. Stronger settings will reduce number of vertices found that results in straighter lines, such as found in mechanical drawings. However, a weak setting is advised for contour drawings for accurate contour replication.



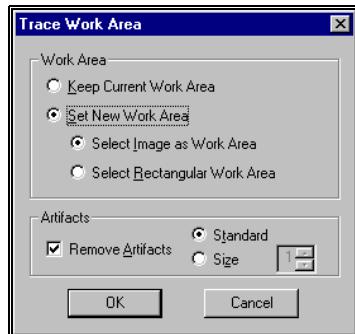
Leave the dialog box with **OK**.

Tracing Contours

We are going to vectorize only the contours of the drawing's component.



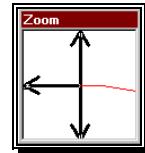
To trace the contours click the **Trace Contours** icon in the **Trace Mode** flyout toolbar (command line: **vptrace**). A dialog box comes up asking you to define a work area.



<input checked="" type="checkbox"/>	VPraster pro
<input checked="" type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Close this dialog with **OK** to work on the entire image. The work area will now be prepared for tracing. As long as the contour trace function is activated a green frame marks the work area and the cursor appears as a **4-Way** cursor. Click on the component's upper outline just right of the vertical axis. The outline will be recognized up to the interruption on the right.

Left of the starting point you see an **intersection**. The tracing process stops and a **zoom** window opens showing an enlargement of this intersection.



By clicking either in the zoom window or in the active raster image you determine the next trace direction. In this example let the tracing continue to the left, so click on the outline left of the vertical axis.



The tracing process will continue in the specified direction and will stop at an interruption. The cursor then changes to an **OK?** to ask you to verify the current line trace was correct. If not, you can click the **Undo Trace** icon (command line: **vprbtrace**) to go back to the last ramification point. Clicking on the right mouse button will undo the traced line while the left mouse button confirms.

Confirm the line with a left mouse click - the cursor changes back to a **4-Way** cursor.

The next fraction of the outline is to be attached to the polyline we have generated. Keep the **[Shift]** key pressed - a **plus sign** will be added to the cursor - and click on the fraction. The outline will be traced up to the next interruption.



Continue tracing the entire outline the same way. At the final interruption the process stops, the remaining gap will not be closed. End the tracing mode by clicking the icon **End Trace** (command line: **vpretrace**) and zoom to this gap. Select the polyline, click on one of the two end points, and drag it onto the opposite one. Deselect the polyline – the outline is now vectorized as a single, continuous polyline.

Tracing Dashed Contours

The component's recess drawn in dashes is going to be edited.



To change the current line type from continuous to dashed, click the AutoCAD icon **Linetype** and load the line type **Dashed2**. Close the dialog box and set this line type as active line type.



Start the **Trace Dashed Contours** function and close with **OK** the upcoming dialog **Trace Work Area** with the option setting **Keep Current Work Area** selected by default. The work area remains unchanged and is marked by a green frame around the entire drawing.



Click the icon **Trace Options** and activate the **Append Mode**. This mode has the same functionality as the **[Shift]** key: a newly trace line will be appended to the previous one.

Click on the line fraction on the lower right of the centerline. It appears marked in the current layer color. Click on the line fraction just to the right of it. This way the system will adjust the gap length to continue in the automatic trace mode. The color changes to magenta (for dashed line type).

The line tracing mode stops when reaching an interconnection - proceed as described above. If the gaps between individual line structures become too large the function will stop. In this case, you will have to start at a new line piece whereby the cursor is connected by a line to the end of the previous line indicating the append mode. Go on this way until the end of the dashed raster line. It is now converted into one dashed vector line.

End the trace mode. For better display of the dashed polylines change the properties of each polyline by marking the **LT Gen** option.

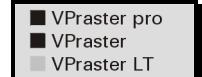
CAD Tracing



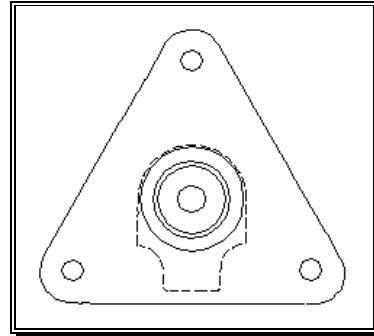
CAD elements like **lines**, **circles**, and **arcs** can be vectorized as entities directly when using the **CAD Trace** function. Call this function (command line: **vprcadtrace**) and keep the current work area. The **needle and thread** cursor appears.

Click on the drilling circle on the lower left. The circle will be recognized and drawn automatically. Now click on the upper drilling circle. Only an arc will be recognized for the drilling has not been drawn all through originally. To add the remaining fractions keep the **[Shift]** key pressed and pick all circle fractions successively.

Proceed the same way with the other drilling circles in the center section and on the lower left.



Switch off the **Raster Display** for a better view of the vector data (end the trace mode before). Now, the drawing should look like this:



Save the drawing as **BEARING_1.DWG**.

Editing Raster by Tracing

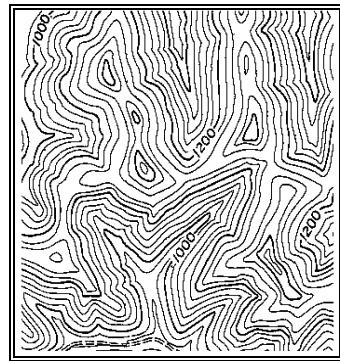
In a raster drawing some solid lines are going to be exchanged by dashed lines. The following steps are necessary:

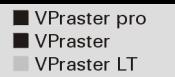
- *vectorizing lines interactively*
- *rasterizing vectorized lines*

Preparation



Start with a new drawing and load the raster file **GEO.TIF** from the **SAMPLES** directory.





Tracing Contours



Click the **Erase Raster Background** mode icon (command line: **vprerasebg**) to delete the raster data during tracing.

Change the current line type to **Dashed2** as described above.



Disable the option **Append Mode** in the dialog **Trace Settings**.



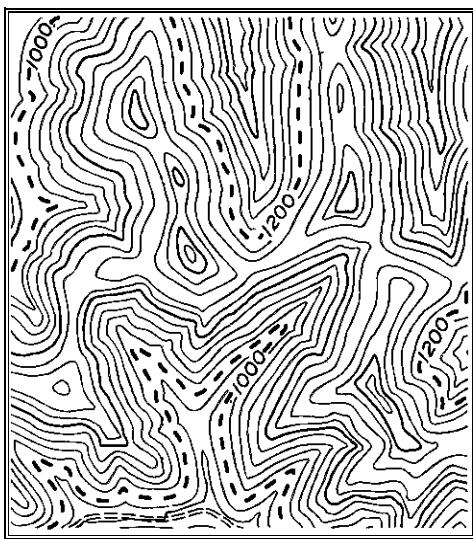
Start the **Contour Trace** function (command line: **vptrace**), set the work area to the entire drawing, and trace all contour lines assigned to 1000 or 1200. End the trace mode. For better display of the dashed polylines change the properties of each polyline by marking the **LT Gen** option.

Rasterizing Vectors

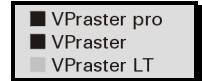


Click the function **Rasterize** (command line: **vprplot**) to open the dialog. Select **Rasterize only Vector Objects**, **All**, and **Delete Objects after Rasterizing**. Close the dialog.

In the following dialog box change the **Width** of color **7** (black) to **0.05**. Click **OK** to start the rasterize process. All polylines generated during tracing will be converted into raster data. The result of this operation should look like this:



Save the raster as **Geo_1.TIF** to the **TUTORIAL** directory.



Lesson Six: Color Reduction/Separation

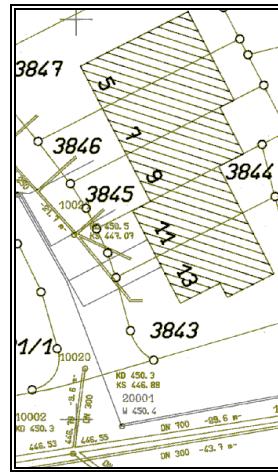
During this lesson you will learn how to

- *combine colors,*
- *change colors,*
- *export raster data separated by colors.*

Preparation



Start with a new drawing and load the raster file **KAT.TIF** from the **TUTORIAL** directory.

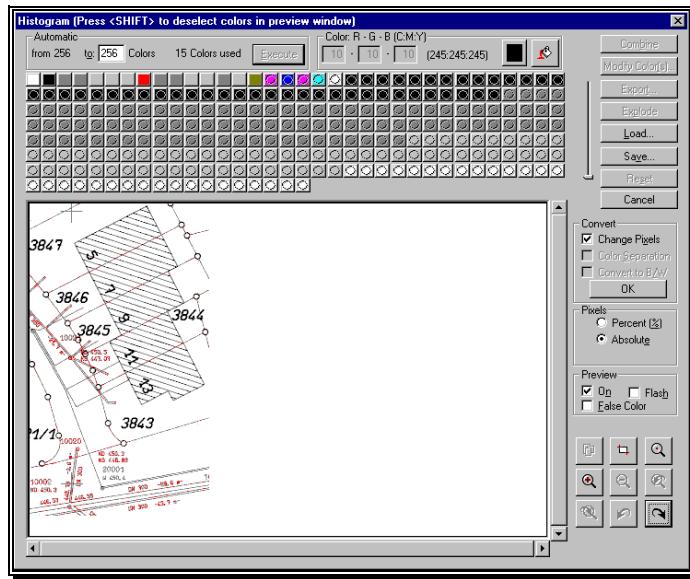
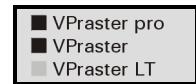


Color Reduction

While scanning the drawing, the colors red, blue, and black have been paled through the white background, i.e. there are intermediate colors added to the basic colors. In the following process the number of colors will be reduced down to four.



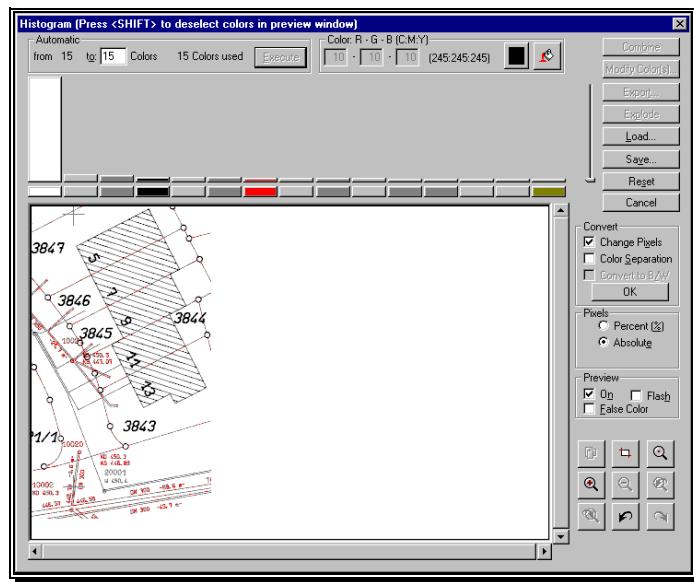
From the **VP HybridCAD** menu, click on the sub menu **Color Tools**. Choose the function **Color Reduction** to display the **Histogram** dialog box:



Depending on the screen resolution there are three different dialog boxes, which are slightly different in appearance, but similar in operation (the snapshot shown is the one for 1024*768 pixel, see **Section 6** for the other two).

In the field **Automatic** in the upper left section you see that this raster file contains 256 color entries but only 15 colors are used in the raster image. Reduce the number of entries to these 15 colors by entering **15** into the edit field and click on **Execute**. With this action no color has been changed or deleted in the raster image. However, the appearance of the **Histogram** changes: only the 15 colors in use are displayed, each as a frequency bar showing the proportionate use.

<input checked="" type="checkbox"/>	VPraster pro
<input checked="" type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT



Selecting and Combining Colors directly from the Image

First start with editing the color red:

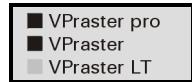


Zoom in the **Preview** to the number **10002** in the lower left section of the drawing using the **Zoom Window** function of the Dialog Box. The digits consist of four different red color tones altogether. The brightest one, also bearing transitions between the last two digits, is to be replaced by the background color white, i.e. both colors are going to be combined.

To combine colors the following steps are necessary:

- select the target color,
- select the colors which should be combined with the target color,
- execute the **Combine** command.

In this case, the bright red color should be combined with the white color to white – so the **white** color is the target color.



To select the white color click on the white background raster with the **pipette cursor** – in the **Histogram** the white color label, below the bar, appears to be recessed. Being the first selection (target color) the color will be assigned a highlighted frame, a flashing action area and displayed in the **Target Color** icon. The RGB and CMY values are displayed in the **Color** field.

You can undo your selection of individual colors by either pressing the **[Shift]** key and clicking on the same raster pixel again, or by clicking the color label in the **Histogram** dialog box. Clicking on the first color you have selected (highlighted frame) the entire selection will be undone.

Add the light red tone between the digits to your selection by clicking with the pipette on one of the pixels. As the **Preview** option is activated by default, the **Preview** immediately reflects the change in the image. Activate the **Flash** option. You see the **Preview** changing automatically between the **Preview on** and **off** state. Thus you see the pixels being affected by the **Combine** command much better.

Verify that important information will not be lost in the image by zooming back to the general view. It is easier to notice immediate changes when the **Flash** option is activated.

Click on **Combine** - all selected colors will be combined to the target color. Alternatively you can use the context sensitive **popup menu** (click on the right mouse button in the **Preview** or the **Histogram** field).

Keep the changes the way they are. Zoom in (very close) to an area of the image where a blue and a black raster line cross. Both lines include a light gray tone. Detect the exact color tones by clicking to both edges with the **Pipette** cursor. In the **Histogram** dialog box you will see that only one color tone has been selected. Both edges bear the same color tone so they cannot be combined to either blue or black. Otherwise the black line would receive a blue edge and vice versa. Solution: combine to white with the background color. Deselect the color and proceed as described above: First select **white** as the target color, then **light gray**. Combine both colors. Just remember that the first selected color is always used as the reference color to which all subsequently picked colors will be converted into.

The blue line primarily consists of two blue tones. Select and combine them (the order of color selection is not relevant).



The gray color tones will be combined to a new color. To choose a new target color, click the **Target Color** icon, select the color **black** in the Windows dialog box **Colors from Basic Colors** (red=0, green=0, blue=0) and close the dialog box.

<input type="checkbox"/>	VPraster pro
<input checked="" type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Now, select the colors to be combined: Zoom in to the black number **3846** in the upper half of the image. Click the left mouse button and move the mouse to draw a rectangle around the last digit:



All colors found in this rectangle are added to the selection: white and four gray tones. Deselect the white color by clicking on the color label in the **Histogram**. **Combine** the four selected gray tones to the new **Target Color** black.

Choosing Colors in the Histogram and Combining to a New Color

Select the three remaining red tones by clicking on the respective color labels in the **Histogram** dialog box. To change the target color click the **Target Color** icon. The standard Windows dialog box **Colors** appears - choose the color **red** from **Basic Colors** ($\text{red}=255$, $\text{green}=0$, $\text{blue}=0$) and close the dialog box.

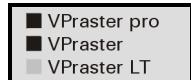
Modifying Colors

The color blue is to be modified to the basic color **blue**. Click on the color label in the **Histogram** dialog box. Then select the **Modify Color(s)** function. You also can use a double click on the blue frequency bar to change the color. In the **Colors** dialog box you can modify the color deliberately. Select as the **Basic Color** **blue** ($\text{red}=0$, $\text{green}=0$, $\text{blue}=255$) and close the dialog box. Just like the combination of colors, these modifications can be undone and redone.

You also can modify several colors by selecting them subsequently and then clicking on **Modify Color(s)**.



You cannot modify any color to a new color that is in use. In this case, use the combine method.



Remaining Colors

Three dominant colors are now apparent along with a few other random colors not having any color correlation to the dominant. You can determine or compare the **pixel** number of these colors in **Percent** and **Absolute** by clicking on the respective color bars. Another way to view the minor colors is by using the sliding **Scale** bar to the right of the **Histogram**. When moving the slider up, you will see the color bars expand or grow in height. This amplified view helps to note the differential intensities of the remaining colors compared to the dominant colors. These remaining low level or residual remaining colors, generally just a few pixels, can now be combined with any of the remaining major color of your choice and should not affect the image.

Select white, either from the **Preview** or the **Histogram**, then click on the left color label of the three remaining colors with the right mouse button. Keep the button pressed and move the cursor to the right until all three colors are selected (window selection) and **Combine** them.

Review the raster image to ensure that you will not lose or color distort any important information when using this reduction operation.

Save Reduction

The color reduction is now completed. The color reduction method used can be saved for use on other similar images. Click the **Save** button of the **Histogram** dialog and name the file **KAT.VPL**.

Leave the dialog with **OK** (make sure that the convert option **Change Pixels** is activated and **Color Separation** deactivated). The raster will be changed according to the previous reduction. At this point a **Redo** is no longer possible.

Color Separation

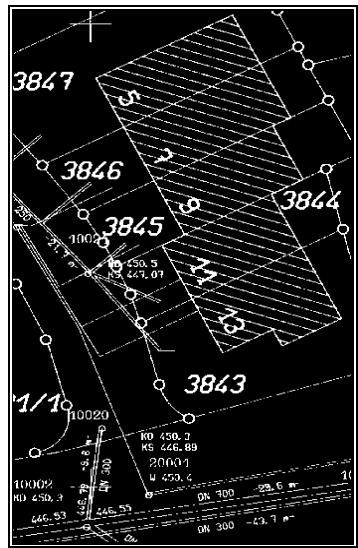
Instead of saving the raster file, reload the file once again, ignoring save warnings. Open the **Color Reduction** dialog (**Raster-Color-Color Reduction**) and load the file **KAT.VPL** using the **Load** command. A color reduction will be performed according to the reduction information saved in the VPL file.

Our raster image has now been reduced to four colors. Each of these colors can be exported and saved as individual black & white raster files. You are limited to a maximum of 16 exported files. It is important to first reduce to this maximum limit of 16 or less colors. Activate the convert option **Color Separation** and click on **OK**.

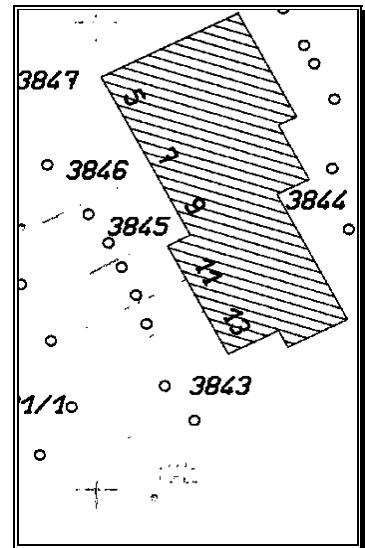
Then, for each color a B/W raster file will be generated and exported. Enter **KAT_1** as the base file name. The name for each raster file will be extended by two digits incrementing from 01 to 04.

■	VPraster pro
■	VPraster
■	VPraster LT

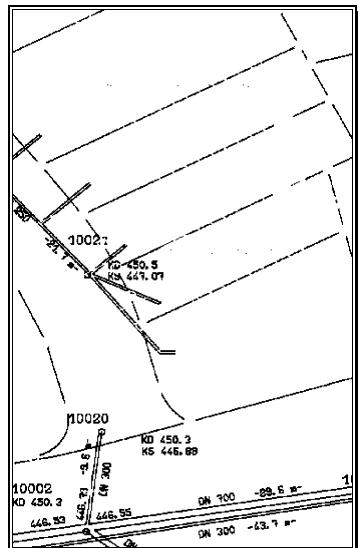
The new B/W raster files, which can be cleaned up and vectorized as usual, should look like this:



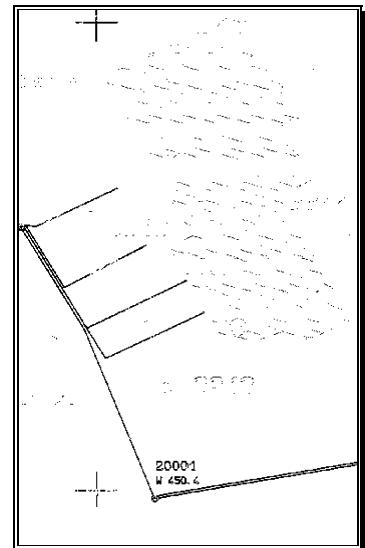
KAT_101.TIF: white



KAT_102.TIF: black



KAT_103.TIF: red



KAT_104.TIF: blue

Lesson Seven: Color Classification

Another approach to reduce the number of colors is the classification method. While color reduction is a palette based process, that is, the entries of the color palette are modified and each modification changes all pixels with this color. The classification gets additional information from the position and the environment of each pixel (e.g. color pattern), so pixels of the same color can be matched with different associative color blends to "different" color patterns.

In this example, classification of colors is preferable for raster images where pixels of similar colors relate to a specific meaning. That is, the many shades of blue relates to the water regions, shades of green to the grassy parks, white for the streets, black for text, etc. By reducing colors to mean specific regions of the image, you also significantly reduce the file size.

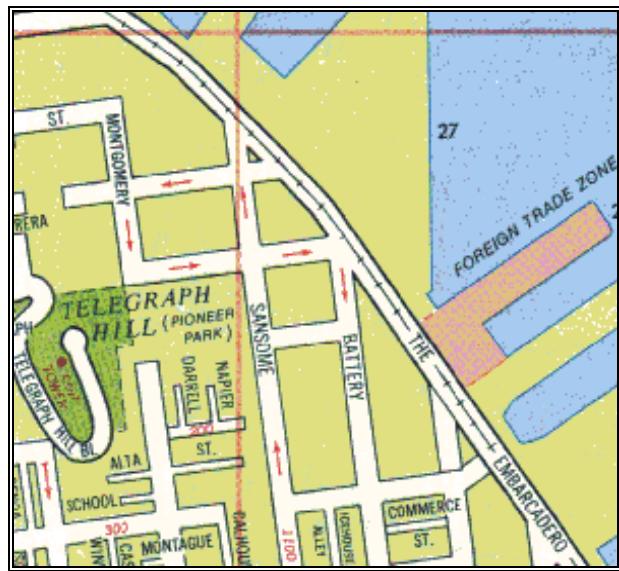
During this lesson you will learn how to

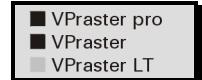
- *analyze colored raster with classes,*
- *define the classes,*
- *perform the classification.*

Preparation



Start a new drawing with **English** default settings and load the raster file **CITY.TIF** from the **TUTORIAL** directory.



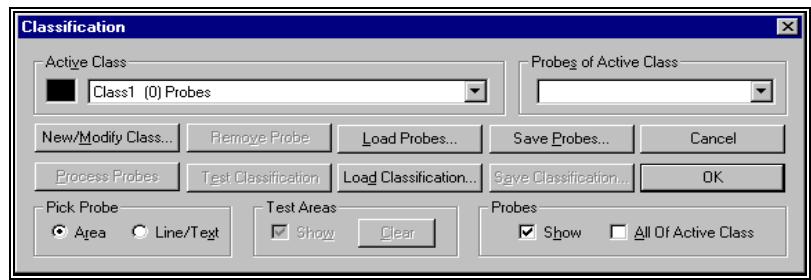


Scale the raster image with the AutoCAD command (Base Point: **0, 0, 0**; scale factor: **400**). Open the dialog box **Units control** (menu **Format - Units**) and change the **Precision** to **0**. In the command line enter **Image quality** and change the setting to **Draft**.

Classification



Open the **Classification** dialog box with **VP HybridCAD - Color Tools - Classification** or click the **Classification** icon in the corresponding toolbar.

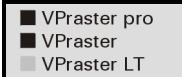


Analyzing the raster, determination of classes

The first step is to determine how many regions/classes the raster consists of. In this raster image there are 7 classes:

- water,
- black text,
- red text,
- buildings,
- streets,
- parks,
- and, as a special class, the foreign trade zone (ftz).

To define the class **Water**, select the first class from the list box **Active Class** and click on **New/Modify Class**. Enter in the **Class** dialog box **Water** as class name and choose the color **Blue**. Close the dialog box and define all classes the same way according to this table:



Class	Name	Color
1	Water	Blue
2	Text	Black
3	Red Text	Dark Red
4	Buildings	Yellow
5	Streets	White
6	Parks	Green
7	FTZ (Foreign Trade Zone)	Red

Classifying colors

The next (and main) step is to define probes for each class. A probe consists of pixels selected from the raster that later ought to be part of this class. By defining probes the class gets information about what color tones it should contain. It is not necessary to select all color tones of a class (selecting color tones means selecting pixels with the desired color tone), this will be done later automatically.

However, it is important to select color tones that cover the range of the class color. For instance, the water region has color tones ranging from bright blue to dark blue. In this case the bright and the dark blue tone must be selected with one or more probes in addition to some (but not all) color tones in between.

Picking area probes



Start with the class **Water**: Select **Water** as the **Active Class** and switch the **Pick Probe** mode to **Area**. The cursor appears as a **bucket** indicating that you can pick rather large areas.

Zoom to the second water region on the top of the raster image and click in the lower half of this region (below the red line). The selected part of the image will appear as a magenta area overlaying the blue part of the image. All pixels in this area become part of the probe. The **Active Class** window shows **Water (1) Probes** indicating that one probe has been picked for the class **Water**.

As you will notice, the dark blue edge of the water region has not been covered, although it should be part of the class. There are two ways to go on now: You may either pick another probe containing these pixels, or you remove the last probe and try to find a new one which includes all important color tones of this class. We will go the second way.

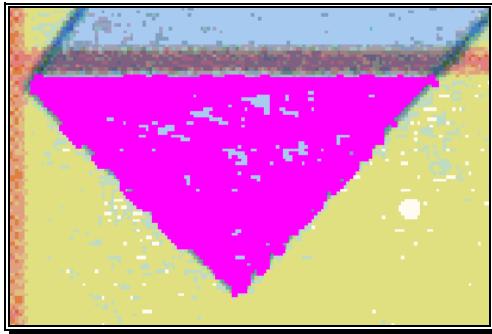
	VPraster pro
	VPraster
	VPraster LT

Click on **Remove Probe** – the magenta area will disappear. For the new probe click on one of the dark blue pixels on the edge. The magenta area will cover a large area of the blue and of the yellow region: this probe cannot be used. Remove it (click on **Remove Probe** or on the right mouse button) and try to pick one of the less dark blue pixels.



The goal is not to find a probe that includes all pixels of the region/class but to find a probe that bears all major color tones of the region.

The magenta area does not have to cover all pixels of the class, since it already contains most of the dark blue pixels on the edge, most of the lighter ones in the center, and no yellow pixels. To get a good probe click at the coordinates 382, 755 – the magenta area will look like this:



Since all major color tones are included in this probe, no additional probes are necessary for this class.

Change the **active class** to **Buildings** and zoom to the block between "Battery" and "Sansome" street. Click right into the block's center. Depending on which pixels you hit, only a small area is selected or almost the whole block is covered. Try to find a probe that includes most of the block's interior **and** most of the darker yellow pixels on the edge. **Do not** hit any black/dark gray pixels from the edge. To get a proper probe for this lesson, click on 473, 438.



In case edges should be part of a class probes have to include pixels of these edges. If you do not want to include edges in a class make sure that no edge pixels will be selected in the probe.

As different probes alter the classification results it is essential that you use probes from regions with the following coordinates:

■	VPraster pro
■	VPraster
■	VPraster LT

Class	Coordinate	Pick Probe Mode
Water	382, 752	
Buildings	472, 437	
Streets	387, 448	
Parks	71, 385	
FTZ	713, 389	

Picking line/text probes



Select **Text** as the active class. Change the **Pick Probe mode** to **Line/Text**. With this mode rather small areas will be selected.

Zoom to the text **TELEGRAPH HILL** and click on the letter **R**. Try to find a probe that covers most of the letter but does not touch the yellow region. Again, it is important to be aware of the edges. Use the coordinates 213, 395.

Change to the **Red Text** class and zoom to the red number **200**. Click on position 285, 210.

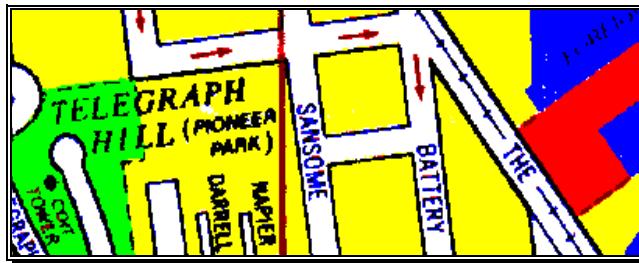
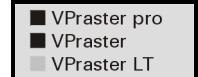
Class	Coordinate	Pick Probe Mode
Text	212, 396	
Red Text	285, 210	

Testing the classification

All previously defined classes have been assigned probes. Now we are going to test the probes whether they contain enough information for a working classification.

Before testing the classification the probes have to be processed – click on **Process Probes**. The dialog **Classification** disappears and a progress bar shows up. Depending on the processing speed of your computer this will take some time.

When the processing is completed click on **Test Classification**. Choose the center area of the raster image as test area with a window frame. The classification for this area will take some time.



Compare the results with the original image by switching the test area off and on (click the checkbox **Show** in the **Test Areas** field). The quality of the probes is displayed in the fields **Active Class** and **Probes of Active Class**. Probes with a low percentage should be revised and replaced by more suitable one. In the test area you will see some errors:

- the black street names are in blue,
- the black text in the water region is almost erased,
- the red text **COIT TOWER** is in black,
- there are white spots in the building region.

Obviously, there were too few color tones included in the probes, especially for the black text. To get better classification probes additional colors have to be picked.

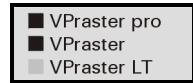
For the black text we only looked at black text on yellow background. For improvement we also have to consider black text on green, on white, and on blue background. Take the probes from the areas that were assigned to the wrong class:

Class	Coordinate	Pick Probe Mode
Text	716, 463 378, 331 107, 385	  

For the classes **Red Text** and **Buildings** click probes at the following coordinates:

Class	Coordinate	Pick Probe Mode
Red Text	77, 304	
Buildings	261, 383	

Clear the test area and test the new probes. Don't forget to process the probes first! Now the results look much better than before, however it can still be improved: The black text on the yellow background is to thick. Some color tones belonging to the buildings class were assigned to the text class.



They have to be picked with a probe of the buildings class:

Class	Coordinate	Pick Probe Mode
Buildings	266, 409	

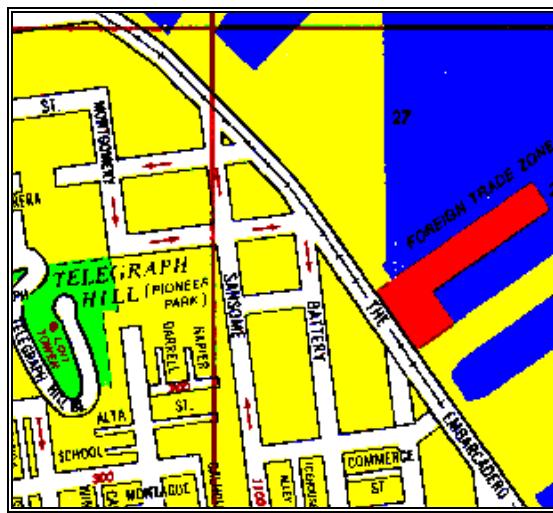
Once again test the classification (**Process Probes** and **Test Classification**). Now the text reads better.

Saving probes and classification

Click on **Save Probes** and save your classes with the assigned probes to **CITY_1.VPS**. If you have similar raster images you can create a **VPS** file containing classes and belonging probes that are likely to apply to these images as well. Then, for each raster image load your **VPS** file and just add the classes and probes which are unique in this image.

Save the processed classification values with ***Save Classification*** to CITY_1.VCS. With this file you can classify raster images with the same regional structure.

Click on **OK**, and the image will be converted to seven colors corresponding with the seven generated classes.



■ VPraster pro
■ VPraster
■ VPraster LT

Lesson Eight : Vectorization (Auto R2V)

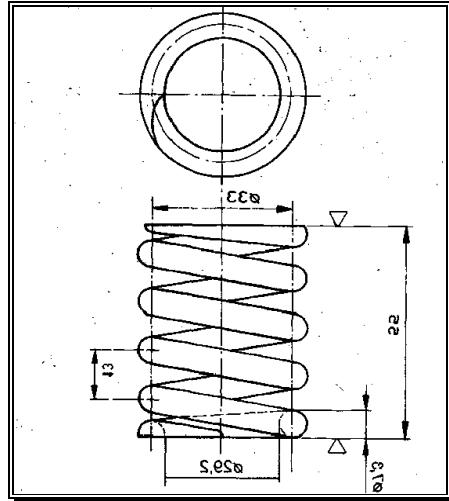
During this lesson you will learn how to

- prepare a raster file for the vectorization,
- vectorize the raster file,
- edit the vectorized data.

Preparing the raster file



Start with a new drawing and import the raster file **TUTOR.TIF** from the **TUTORIAL** directory.



The entire raster file is going to be horizontally mirrored, deskewed, and cleaned (despeckled).

Next, single raster elements will be deleted, redrawn, or moved.

Mirror, Deskew, and Despeckle



To mirror the raster use the function **Horizontal Mirror**. Next, click on **Auto Cleanup** – the raster data are automatically **deskewed** and **despeckled**.

■	VPraster pro
■	VPraster
■	VPraster LT

Erasing Raster Elements

The remaining speckles are to be removed.



Click the function **Erase Raster** (command line: **vprerase**), select the mode **Select Rectangle** and mark the remaining speckles. To end the selection click on **Confirm Raster Selection** or press **[Enter]**.

Draw Raster Line

Next, a line will be drawn over a fragmented raster line.

Zoom into the area around the upper horizontal measure line (033). This line's raster representation is interrupted at several positions.



Activate the **Dynamic Width** option (command line: **vprpickwidth**) and start the function **Draw Line** (command line: **vprdlline**).

Set the starting point of the new line on the left part of the measure line – the width of the new line is adapted to this part. Click on the opposite part of the measure line to place the end point there and end the function.

Move Raster

The left vertical dimensioning string 55 is to be placed on the left side of the dimensioning line.



Zoom in to this area and click on **Move Raster** (command line: **vprmmove**). Mark the string (selection mode **Select Rectangle**) and end the selection. Move the raster object left of the dimensioning line.

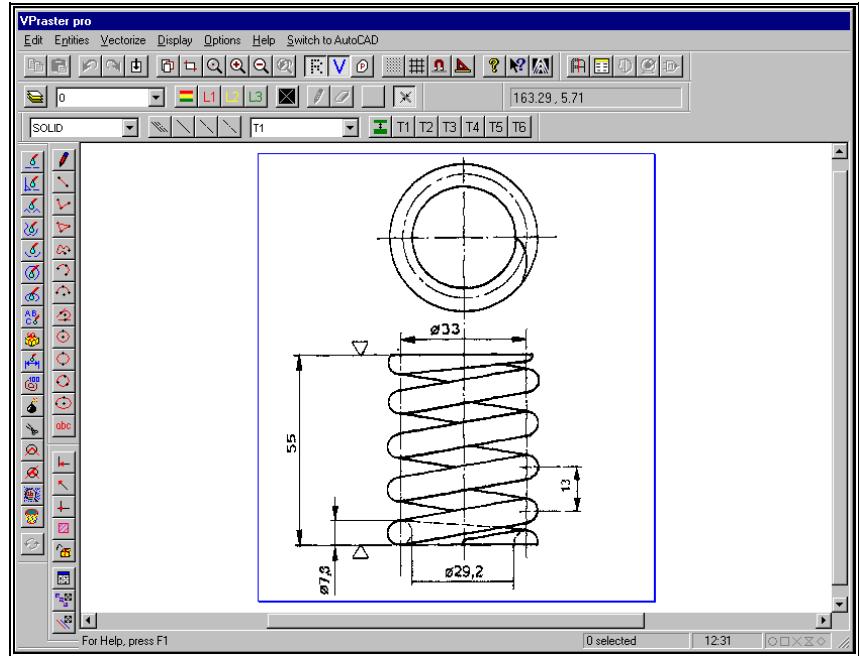
<input checked="" type="checkbox"/>	VPraster pro
<input type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Vectorizing the Raster File

The edited raster file is to be vectorized.



Click on **Vectorize** (command line: **vprvec**) to open the vectorization window of VPraster pro:



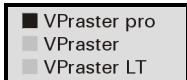
Raw Data Vectorization



Click on the **Vectorize** icon or select from the menu **Vectorize** the function **Vectorize**. In the respective dialog box select the settings **Centerline Vectorization** and **Whole Drawing**. Both are defaults. Keep these settings and start the vectorization with **OK**. Note that this action only takes a few seconds, depending on your PC speed. The progress bar (in the status bar) displays the processing completion status.



The initial conversion result displays the **raw vectors** as an overlay above the **raster data** (Both will appear in the same color). To view the vectors, you can toggle the display on/off with the **[F4]** key or with the **Raster Display** icon. You can also use the **[F5]** key or the **Vector Display** icon for switching on/off the vector display.



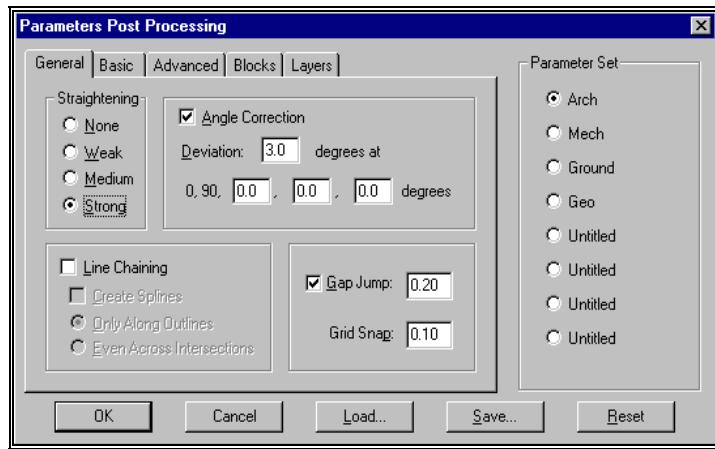
The initial conversion produces **raw vectorization** data and will purposely appear quite poor in quality and should never be exported as CAD-Ready. This first step of vectorization creates raw vector data that must be **Post Processed** to obtain the desired CAD entities such as lines, arcs, text, etc.

Post Processing

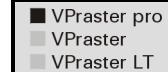
We'll now load a post processing parameter file that has been created for use with this image.



Click the **Parameters** icon or select from the menu **Options** the function **Parameter Post Processing** to open the dialog box **Parameters Post Processing**.



First, click on one of the empty entries (**Untitled**) in the **Parameter Set** list. Then click **Load** and select the parameter file **TUTOR.PCF** from the **TUTORIAL** subdirectory. The file name will be inserted into the marked entry field. The pre-configured settings are now available.



Now click on the tab **Layer** and then on **Preview**. The preview function requires your screen display set to **256 colors or more**. If the graphics board in use has less than 256 colors a warning message will be displayed. You can now adjust your **Line Weight classification** dynamically. Set the bar between **red** and **yellow** in such a way that you will get a good separation of line weight classes focusing on the dimension lines (red color) and object geometry (yellow color). Move the dialog box for a better view on the drawing. Ideally, in this case, you want to separate the spring geometry from the dimension data. Close the preview, the first limit should be around

0.40 [mm] or 0.016 [inch].

These values cannot be entered via keyboard; instead, use the sliders!

In the **General** tab, you will note that the **Straightening** parameter is set to **Strong**. This increases the tolerance and assigns the maximum line straightening, i.e. rather arcs, circles, lines etc. than polylines are generated. **Angles** will be corrected at 0°, 45°, and 90° (i.e. the angle orientation of a 43° line will be corrected to 45° if the deviation tolerance is set for ±3°). The **Text** option in the **Basic** tab is set to **Only Horizontal**. In the drawing, however, there is also vertical text (dimensioning): Change this setting to **Horizontal and Vertical**.

Switch to the **Advanced** panel and mark the setting for **Arrowheads**. Measure the actual arrow length by clicking first into the enter field, then pressing the **[F2]** key. Zoom in to one of the arrowheads and draw a two-point line starting from the tip and ending on the base (second mouse click). The length value of the drawn line will now appear in the enter field and should be approximately:

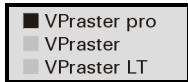
4.50 [mm] or 0.18 [inch].

All other parameter values are pre-configured for the included sample file. You should review each one for understanding the values chosen. Note that unused parameters will be grayed out. It is important to remember that for optimum post processing, you should not activate any parameter settings for patterns that do not exist in the image. That is, if your drawing does not have dashed lines, leave the dashed line parameter setting 'off'. Avoid using random or "wild" settings, as this will only lead to unexpected results. Refer to your manual for further instructions.



Confirm your settings with **OK** and click on the **Post Process** icon - the parameter dialog box opens once again to let you check if the correct settings are active. Start the **Post Processing** by clicking **OK**. The process can include a total of seven processing steps depending on the parameters. In the status bar the progress during processing will be indicated. When completed the generated vectors will overlay the raster data as colored entities. Switch off the raster display with **[F4]** or by clicking the **Raster Display** icon for an isolated display of the vector data.

Save the file, according to our previous settings in the **Save** and **Save As** dialog. The VCF file is now ready for vector editing or final clean up before exporting it.

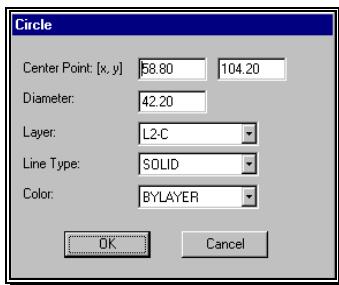


Editing Vector Data

During this lesson you will learn how to edit the vectorized data and to export the vectorized data into a DXF file.

Line Weight Classification

In the vector display, you will notice that the vector lines of the spring object are **yellow** in color as per the **L2** layer definition. **Double** click on one of two circles in cyan color to open the property dialog box **Circle**. The selected circle resides in layer **L2-C** (C for circles) as defined for layer **L2**. Similarly, you will see that the spring's arc elements in green color are assigned to layer **L2-A** (A for arcs).



Some of the dimension lines, however, are displayed yellow instead of red. This means that they were assigned to another layer because the arrowhead widths affected the average line width value.



These lines are easily transferred to layer **L1**. Select all dimensioning lines that are in yellow instead of red by clicking on them consecutively (these lines will be displayed dashed as a highlight). Then click on the **Set L1 Active** icon. All lines previously selected will now be transferred to layer **L1** and become **red**.

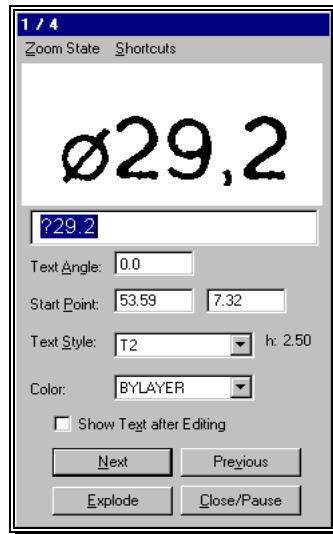
Reviewing Text



Click on the **Review Text** icon. A dialog box appears. It displays the raster section of the first text string found along with the recognition result. Also, the text position in the drawing will be zoomed in and the selected text vectors are displayed and highlighted. If the recognition is incorrect, mark the respective character(s) with your mouse and enter the correction from your keyboard or from within the box's menu item **Shortcuts**. Enter the **ø** sign via **[Alt + 1]** (**Shortcut** function). In the menu **Shortcuts** this special character has been defined by default. **Text Style** (text height), **Text Angle** and **Start Point** may be edited directly.

■ VPraster pro
■ VPraster
■ VPraster LT

Sometimes unrecognized text can appear together with a recognized text string. These vectors can be combined with the partially recognized text by picking the vectors you want to also combine, followed by placing the cursor in the text frame and manually type in the desired text. You also can deselect vectors **not** belonging to the text by holding the **[Shift]** key and clicking on the desired vector(s).



Clicking **Next** allows you to inspect the next text sequence for editing, and so on.

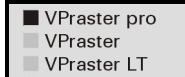
Interactive Text Recognition

The lower left dimensioning string **ø7,3** may not have been recognized (which was purposely distorted), which is why this text string does not appear during the process **Review Text**. Drawings with very poor text imaging are best modified using the interactive text command.



Zoom in to this area and window select all vectors belonging to this text (the selected vectors turn into dashed lines as a highlight). Click the **Combine to Text** icon.

The raster area and the recognized text string are displayed in the dialog window. If it shows correctly **ø7,3**, click **OK**, otherwise edit the text appropriately. Now, all text strings are correct.



Changing Text Heights



Sometimes text strings are represented as different text heights, though they appear to be the same height. This is easily corrected. Select all text strings (they will receive the color magenta) and click on the **Set T3 Active** icon. For bulk conversion of text height of the entire drawing, window pick the whole drawing, then click the desired **T#**.

Changing Line Types



The extension line on the left has been drawn in dashes instead of dash dots. Change this line type by selecting the line and then clicking on the **Set DD1 Active** icon. Use the **Redraw** function to refresh the image.

Combining Line Fragments



The vertical dimension line next to the **55** text string consists of several line fragments due to poor raster quality, which is often encountered. Select the three line fragments (you can also use window crossing) and click on the **Combine to Ortho Line** icon. The line fragments are instantly combined to a single line. When combining lines (non-ortho), lines become connected at the angle of the algebraic sum difference(s).



Two or more vectors are required in order to be combined for arcs and circles. Refer to your operating manual for more information.

Deleting Vectors



Some of the raw vectors belonging to the dash dotted lines or circles have not been assigned correctly. They are drawn as individual red lines, e.g. in the case of the magenta colored circle. The short line pieces can be deleted. Also, there might be some arrowheads in the center of the spring object not belonging there.

Select the line pieces and the arrowheads - zoom in to the drawing to find all other short lines - and click on the **Delete** icon or press the **[Del]** key. All selected vectors will be deleted. Use the **Redraw** function to refresh the display.

It may occur that several arrowheads are overlaying each other, i.e. only the uppermost arrowhead has been deleted while the one underneath will now appear in display. Keep on deleting all false arrowheads repetitively.

Use the **Undo** function to undo any delete action and to restore vectors that have been deleted by mistake.

■ VPraster pro
■ VPraster
■ VPraster LT

CAD Tools

Set Dimension Arrows



Select **CAD Options** (icon) and set **Length of dim. arrowhead** to **4.5 [mm] = 0.18 [inch]**.



Arrowheads are missing on the lower horizontal dimension line, since there were none in the raster image. Click on the **Dimension Arrow** icon, then **first** on the dimension line and **second** on the extension line. The arrowhead is set. Repeat this procedure on the opposite dimension line end.

It is possible that the dimension arrows on the lower left vertical extension line ($\phi 7,3$) were not recognized or that an arrowhead was set in error. Delete any of the misplaced dimension arrowheads and insert new ones in the correct orientation. Exit from this function by clicking on the arrowhead icon when finished. Remember that when an icon appears extruded, it is off, and when recessed with a lighter background, it is active.

Moving a Circle

Click on the dash dotted magenta center circle in the top view. Two **handles** appear, one (containing a cross) marks the center point of the circle, the other one the radius.

Click with the left mouse button on the **center point handle** and keep the button pressed. Now you can move the circle - move it into the intersection of the two axes. Release the mouse button and deselect the entity with a click on the **right mouse button**.

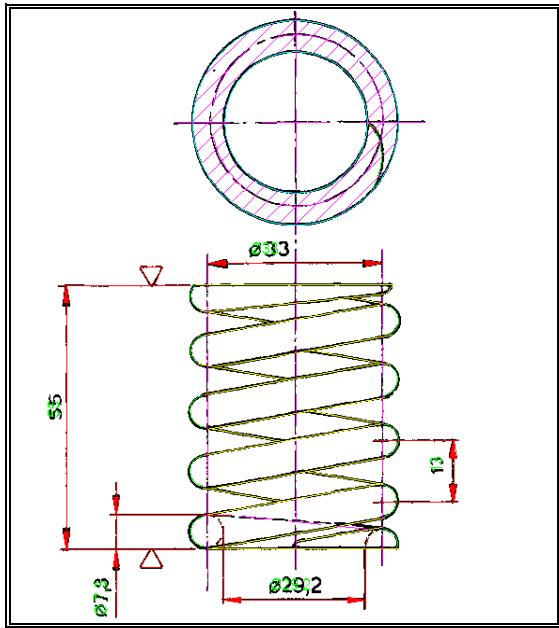
Create a New Hatch



Click on the **Hatch** icon and select the outer and inner cyan circles in the top view of the spring object. Then press the **[Enter]** key - the spring's sectional view will be hatched. Exit from this function by clicking the **Hatch** icon again.

VPraster pro
VPraster
VPraster LT

The vectorized and edited drawing is now completed.



Switch back to AutoCAD



Click on this icon or select **Switch to AutoCAD** from the menu to switch back to the AutoCAD main window. All vector data is transferred to the actual drawing.

VPraster pro
VPraster
VPraster LT

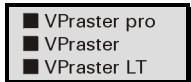
End of Tutorial: Going Ahead

We highly recommend that you review and edit our other sample raster files. It is very important that you become familiar with **VP HybridCAD** software. After a little practice, you will become expert in determining the optimum methods and system settings.

Good Success with VP HybridCAD software!

Section 4

This section applies to:



Operation: General Functions

Basics

The program design is in full compliance with conventions **AutoCAD R14/2000** or **AutoCAD LT 97/98/2000**. Basic knowledge in the use AutoCAD is assumed. Please refer to your AutoCAD manual for details concerning AutoCAD functionality.

Specials with AutoCAD 2000 and AutoCAD LT 2000

AutoCAD (LT) 2000 can open more than one drawing at a time with MDI (Multi Document Interface). This feature is not available when operating AutoCAD (LT) 2000 with VP HybridCAD. This means, AutoCAD (LT) 2000 + VP HybridCAD can only use the SDI (Single Document Interface) feature.

Specials with AutoCAD LT 97/98/2000

There are **no** limitations in functionality for AutoCAD LT 97/98/2000. Only the command line operation implies some special requirements:

- A special command must precede the **VP HybridCAD** command:
image when using **AutoCAD LT 97/98**
vprlt when using **AutoCAD LT 2000**
- After this command enter a space and the **VP HybridCAD** command, e.g.
image vprLoad or
vprlt vprLoad, respectively
- The **[Enter]** key for repeating the last command will not work with most of the **VP HybridCAD** functions.

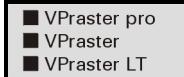
Working with Multiple Raster Images



VP HybridCAD indicates one of the attached raster images of the current drawing as the **Active Image**.



All raster editing tools globally affect the whole image (e.g. raster file edit, color/filter tools, tracing, rasterization, etc.) are automatically related to the **Active Image**. The **Active Image** is shown in **red** (all red for B/W images, a **red frame** for colored images).



The **Active Image** name is displayed in the combo box of the **Tools** toolbar. You can change the **Active Image** by selecting another name from the combo box.



Clicking this button or with the **Active Image** function from the **VP HybridCAD** menu you can also select a raster image to become the Active Image.

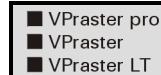
At the command prompt, enter **vprselimage**

VP HybridCAD Menu

VP HybridCAD adds by default a *VP HybridCAD* menu item and 8 toolbars to the AutoCAD menu:

- **General**
- **Raster File Edit**
- **Edit**
- **Tools**
- **Draw/Erase Raster**
- **Trace**
- **Vectorize**
- **Color/Filter**

Except for **Tools** you can modify these toolbars via the standard AutoCAD **toolbar** command. The **Tools** toolbar is a special toolbar which **cannot** be modified. Also, this toolbar requires the space of a whole "line" in the AutoCAD dock bar.



All functions available in **VP HybridCAD** are located in this menu:



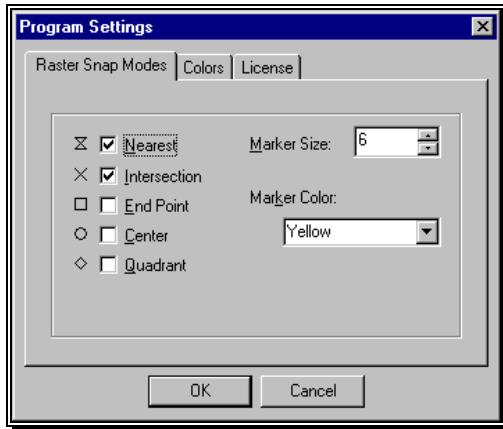


Program Settings



Settings are available for **Raster Snap**, **Colors**, and **License**.

At the command prompt, enter **vprsettings**



Raster Snap Tab

If **Raster Snap** is on, the desired **Raster Snap Modes** can be activated by clicking the according check boxes. There are five modes available:

- **Nearest** snaps to the nearest middle point of the raster element.
- **Intersection** snaps to the nearest intersection of the raster element.
- **End Point** snaps to the nearest end point of a raster element.
- **Center** snaps to the center of the nearest raster circle or arc.
- **Quadrant** snaps to a quadrant (0° , 90° , 180° , 270°) of the nearest raster circle or arc.

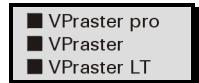
The sensitive area of the **Raster Snap** (about. 200 by 200 pixels at the present mouse position) is fixed preset to guarantee the optimal usability with a maximum of speed.

While using the raster snap the active mode can be changed clockwise to a different snap mode using the **[TAB]**-key.

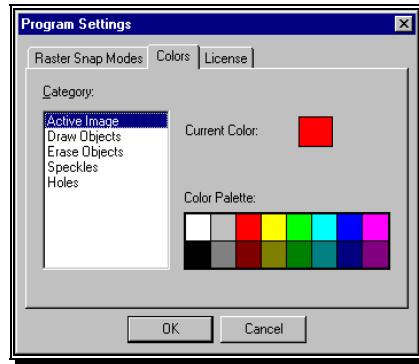
The different snap modes are displayed with the symbols shown in the dialog box.

With **Marker Size** and **Marker Color** the symbols can modified accordingly .

Default: **Marker Size :** **6 pixels**
 Marker Color: **Yellow**



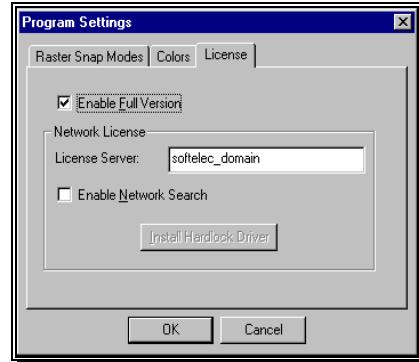
Colors Tab



The color of the following items can be modified (default values in brackets):

- **Active Image** (red)
- **Draw Objects** (green)
- **Erase Objects** (blue)
- **Speckles** (green)
- **Holes** (yellow)

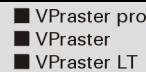
License Tab



Enable Full Version[on/off]

Allows the permanent setting to a **VP HybridCAD** full version product. Otherwise, the software operates in the demo mode and does not search for a license (hardlock).

If there is a **Network License** available, with **License Server** you can predefine where to search for a **VP HybridCAD** network license.



Enable Network Search[on/off]

If set **on**, the whole network will be scanned for a valid **VP Network License**, if no license was found at the predefined location. This operation may take some time.

If the Sentinel driver for the hardlock is not installed (e.g. only the Demo Version is installed), the button **Install hardware lock driver** is active. Click on the button for installation.



Administrator rights are necessary to install the hardlock driver.

Show Toolbars

For displaying the **VP HybridCAD** toolbars you can use the following functions and also the standard AutoCAD *toolbar* command.

General

Shows the **General** toolbar for basic raster Input/Output commands.

At the command prompt, enter **toolbar**

Raster File Edit

Shows the **Raster File Edit** toolbar for basic raster file manipulation, such as despeckling, cut window ,deskew, etc.

At the command prompt, enter **toolbar**

Edit

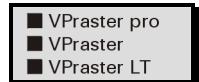
Shows the **Edit** toolbar for raster pixel manipulation, such as erase, copy, move raster. Also, this toolbar offers enhanced raster selection functionality.

At the command prompt, enter **toolbar**

Tools

Shows the **Tools** toolbar. This is a special **VP HybridCAD** toolbar indicating the **Active Image** and containing buttons for Raster Snap, Erase Raster, etc.

At the command prompt, enter **vprshowtb**



Erase/Draw Raster

Shows the **Erase/Draw** toolbar. This toolbar contains some basic draw functions for erasing or drawing into the active raster image without the requirement of rasterizing.

At the command prompt, enter **toolbar**

Trace

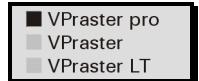
Shows the **Trace** toolbar for tracing/line following commands.

At the command prompt, enter **toolbar**

Color/Filter

Shows the **Color/Filter** toolbar for manipulation of colored and gray scale images.

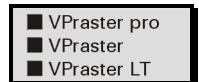
At the command prompt, enter **toolbar**



Vectorize

Shows the **Vectorize** toolbar for the vectorize command.

At the command prompt, enter **toolbar**



Load Raster Image



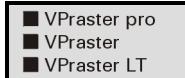
When clicking this command a dialog box opens to select a raster file.

At the command prompt, enter **vprload**

All supported raster file types are displayed. After selecting a file a preview is shown if the **Preview** check box is switched on and the file format is supported.



We strongly recommend to use this function to attach new raster images to your AutoCAD drawing instead of the AutoCAD *image attach* command. Only the **Load Raster File** will read and store all necessary information, such as the image size, the DPI value (Dots Per Inch), etc. in order to support raster processes, for example rubber sheeting etc.



Save Raster Image



Saves a raster image.

At the command prompt, enter **vprsave**

Select Image <Active Image>: Select the raster image you want to save by clicking on its frame or press **[Enter]** to save the **Active Image**.

After the selection a dialog box opens for selecting the format, the file name, and a valid directory. The following formats can be exported:

TIFF, GP4, CG4, C4, CAL, RLC, PCX, BMP, GIF, RLE, CIT, JPG, CRL

With **Options** a dialog box opens when **JPG** or **TIF** formats are selected allowing for more detailed format specification.

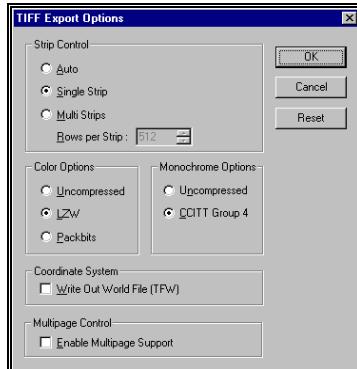
If **JPG** was selected, you can here specify the **Quality** of the JPEG-file. **Low Quality** means high compression but also high color quality loss, **High Quality** means low compression but image will remain in high quality.

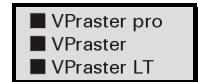
TIFF Export Options

Exporting raster images using the TIFF file format provides a choice of several compression methods, strip sizes, and to create an additional World File. The current settings are saved and will be used for future TIFF export operations. Modification of the settings is recommended only in the case problems are encountered when loading exported files into other applications.

For most images the default settings produce the smallest file sizes that can be loaded into most applications.

Clicking the **Reset** button, all options are reset to default values.





Strip Control

TIFF data can be written in whole (single strip) or in strips. Select between:

- **Auto** calculates the strip size so that it amounts to roughly 8 KB of uncompressed data.
- **Single Strip** writes the file in whole.
- **Multi Strips** The number of **Rows Per Strip** can be entered into the edit field.

Default: 512

Default: Single Strip



A large number of strips result in large file sizes. Also, do **not** choose the option **Auto** with wide images (> 6.000 pixels).

Compression

The compression method substantially affects the resulting file size.

Colored images can be compressed as follows:

- **Uncompressed** the data will not be compressed.
- **LZW** typically generates the smallest file sizes.
- **Packbits** compresses data using the Packbits method.

Monochrome (B/W) images allow these options:

- **Uncompressed** the data will not be compressed.
- **CCITT Group 4** generates highly compressed data.

Write Out World File (TFW)

Activating this check box results in the creation of an additional World File, where geo-referencing information is registered that is used together with the raster data for mapping or GIS applications. The World File bears the associated TIFF file's name with the extension TFW.



In order to generate a valid TFW file it is necessary to choose **Meter (m)** as **User Units**. Entering any other unit will bring up a message box indicating that a TFW file cannot be created.



Enable Multipage Support

Activate this check box if you want to create or modify an existing TIFF-Multipage file. If an existing file has been selected in the **Export** dialog and this option is enabled the **Multipage** dialog is displayed where you can choose to append the current image to the selected file or replace an existing page.

Save RasterDWG



Saves the drawing as a **RasterDWG** file.

At the command prompt, enter **vpr saverdwg**

A dialog box opens for selecting the file name and a valid directory. **RasterDWG** is a special **VP HybridCAD** DWG format, saving all data of your current drawing, i.e. vector **and** raster data into **one** DWG file.

Especially the raster images can be saved into the **RasterDWG** file. Even if no **VP HybridCAD** application is installed to an AutoCAD, this file can be loaded, viewed, and plotted in AutoCAD using our free **RasterDWG** driver (**RDWG**). This driver is part of your **VP HybridCAD** CD. You can share it with any of your customers, clients, etc.

Create New Raster



A new and empty raster image is created.

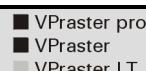
At the command prompt, enter **vprcreate**

New Image – Color/ < Black&White >: Type **c** for color or press **[Enter]**

Image Resolution [dpi] <400>: Enter a value or press **[Enter]**

Insertion Point <0,0>: Specify a point, enter a value, or press **[Enter]**

Other Corner: Specify a point or enter a value



Scan

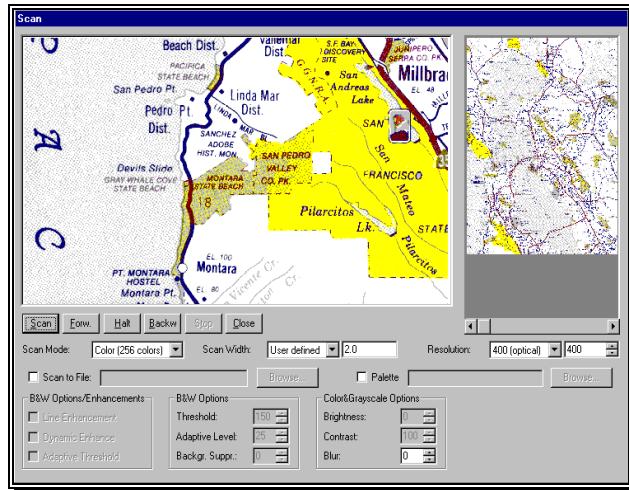


Scans a drawing into AutoCAD.

At the command prompt, enter **vprscan**

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Large format scanners can be operated directly from within the program. Depending on the type of scanner a corresponding dialog box opens to enter the essential parameter settings according to the respective scanner's specifications. For more information regarding supported scanners and their operation see the **Appendix**.



Dialog Box used for CONTEX Scanners

Show Raster Image Info

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| ■ | VPraster pro |
| ■ | VPraster |
| ■ | VPraster LT |

A Dialog pops up showing all information about a selected raster image or the **Active Image**

At the command prompt, enter **vprimageinfo**

Select Image <Active Imager>: Select a raster image or press [Enter]

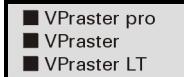
Rasterize Entities



Rasterizes vector entities into the **Active Image**.

At the command prompt, enter **vprplot**

A dialog box pops up for a pre-selection what to rasterize:



Objects to Rasterize

Select the type of entities to be rasterized.

Rasterize only Raster Objects rasterizes only these elements into the **Active Image**.

Rasterize only Vector Objects rasterizes only vector data.

Rasterize Raster and Vector Objects rasterizes all of the entities of the drawing into the **Active Image**.

If **Erase Mode** or **All Vectors in Erase Mode** is **on**, all raster structures under-laying the vector elements are erased. The vector elements remain after rasterization or will be deleted if **Delete Objects after Rasterization** has been selected.

Which Objects

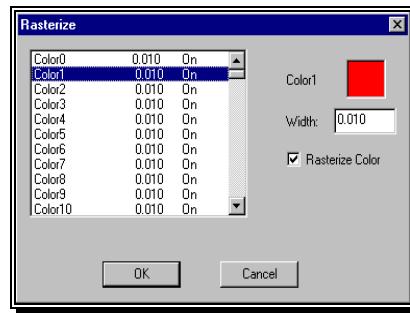
Select, whether **All** entities of the drawing or only a **Selection** will be rasterized. If **Selection** is **on**, you will be asked after **OK** to select the entities.

Delete Objects after Rasterization [on/off]

If **on**, the selected entities for rasterization will be deleted afterwards.

If any vector data have been selected for rasterization (no matter whether in **Erase Mode** or not), a dialog box opens to assign the line **Width** for each **Color** used for drawing the vector elements. Dimension in **[bu]**.

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Rasterize Color

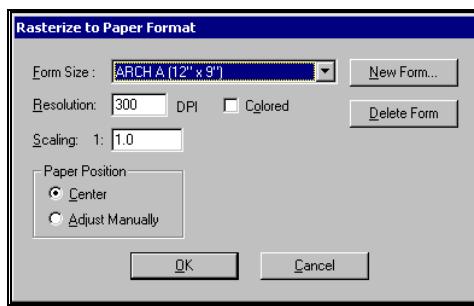
If set to **on** all entities with the selected, color will be rasterized.

Since **VP HybridCAD** uses the AutoCAD plotter driver for executing rasterization, a long list of commands may be prompted in the command line during rasterization. Just wait.

Rasterize to Paper Format

Rasterizes all raster and vector entities into a new raster image. A dialog pops up for specifying the size of the target raster image.

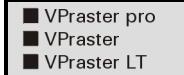
At the command prompt, enter **vprrtopaper**.



Form Size allows to select the size of the target raster image from a list of standard formats. The best fitting form is pre-selected. The format named "**Exact**" is a special format that adapts its size to the extents of all raster and vector entities.

The button **New Form** opens a dialog box to enter the data of a new form. The values refer to the setting of **Drawing Units** (pixels, mm, or inches).

Delete Form deletes the selected form.



Resolution specifies the desired resolution in DPI for the target raster image.

If **Colored** is checked (set to **on**) the target image will contain the standard color palette and colored raster or vector entities are rasterized in color.

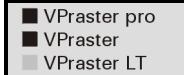
Scaling allows to set a scale factor for the target raster image.

Paper Position places the raster and vector entities on the target raster image: With **Center** raster and vector entities are positioned on the center of the paper. **Manually** allows for an individual placement of the entities. After closing the dialog with **OK** use the mouse to position the paper frame.

Clicking **OK** opens the dialog for specifying line widths for rasterization (see above).

Raster File Edit

A set of raster file editing functions, such as despeckling, cut window, deskew, etc. are available. See **Section 6**.



Split Raster Image

Splits the **Active Image** into several raster files. See **Section 8**.

At the command prompt, enter **vprsplit**

Merge Raster Image



Merges a raster file with the **Active Image**. See **Section 8**.

At the command prompt, enter **vprmerge**

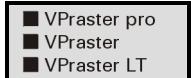
Cut to Paper Format

Cuts a raster file fitting to a selected format. See **Section 8**.

At the command prompt, enter **vprcutformat**

Rubber Sheeting

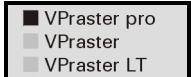
A set of rubber sheeting functions is available. See **Section 8**.



Vectorize

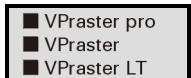


Vectorization and a set of editing tools is available. See below and **Section 10**.



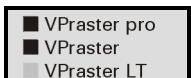
Edit Raster

A set of raster editing functions, such as erase, move, copy, etc. and some raster select functions are available. See **Section 5**.



Erase Raster

A set of enhanced erase functions is available. See **Section 5**.



Draw Raster

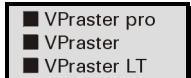
A set of raster drawing functions is available. See **Section 5**.

Tracing

A set of tracing/line following functions is available. See **Section 9**.

Color/Filter

A set of color/palette manipulations is available. See **Section 7**.

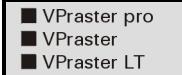


Raster Snap [F11] [on/off]



The raster snap can be switched **on** or **off**. Define the active **Raster Snap Modes** with **VP HybridCAD - Program Settings - Tab Raster Snap**.

At the command prompt, enter **vprsnap**



Delete Raster Background [on/off] (under vectors)



When redrawing or tracing raster structures, **Delete Raster Background** can be used to simultaneously erase the raster structures in the background.
At the command prompt, enter **vprerase**

Auto Regenerate [on/off]



If set to **on** an automatic regeneration occurs after every operation modifying the raster to keep the raster image in the background. With large drawings this may slow down the performance of raster editing. Then switch **off** and use the **VP HybridCAD Regenerate** command to update the display whenever required.

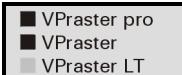
At the command prompt, enter **vprautoregen**

Show Raster [on/off]



Switches the display of raster images on and off.

At the command prompt, enter **vprshowraster**

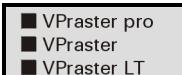


Dynamic Width [on/off]



If set to **on** the raster draw functions use the original raster width as line width.
See **Section 5**.

At the command prompt, enter **vprpickwidth**



Zoom Active Image



Zooms to the **Active Image**'s extents.

At the command prompt, enter **vprzimage**

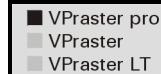
Select Active Image



Selects the new **Active Image** from the drawing.

At the command prompt, enter **vprselimage**

Select Image: Pick the frame of a raster image



Regenerate



Executes a *send to back* command for the **Active Image** and a *regen* to update the display accordingly.

At the command prompt, enter **vprtoback**

Raster-to-Vector Conversion

Basics



After invoking the **VPraster pro** vectorization mode the main program window changes providing special **VP HybridCAD** functions for vectorization of the **Active Image**. AutoCAD functions and entities are not available during this mode.

Most functions and routines can be activated through graphic symbols (icons) or by clicking on commands listed in the pull-down menus. Using **[F1]** offers access to an extensive online help at any time.

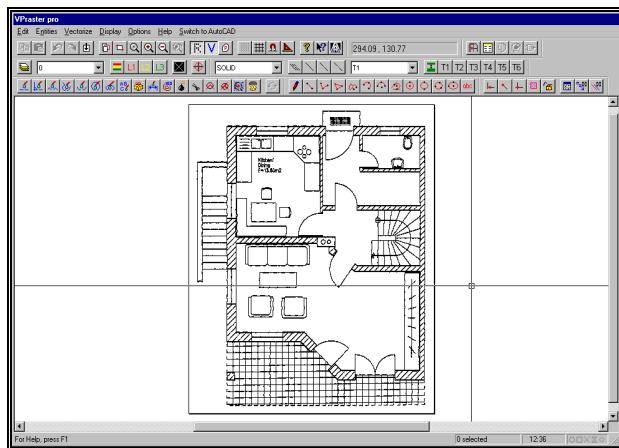


In order to leave the vectorization mode and transfer the vectorized and edited entities to the AutoCAD window click this icon or the menu **Switch to AutoCAD**.

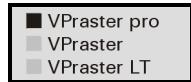
Main Menu



After invoking the **VPraster pro** vectorization mode the main program window is changed:



VPraster pro vectorization mode showing all Toolbars



In **Options - Toolbars** the user can activate his icon groups individually, according to the needs of the specific application on hand. Moreover, these icon groups are subject to deliberate positioning on the screen, even within the working area.

VPraster pro Graphic Display

These pull down menus are available:

- ***File***
- ***Entities***
- ***Vectorize***
- ***Display***
- ***Options***
- ***Help***
- ***Switch to AutoCAD***

Their sub-menus contain all of the program's commands and available process routines. Additionally, the main functions can be activated directly either through icons or short-cuts.

General Functions

Icons are activated by clicking on the **left mouse button**. When **Show Tool Tips** in **Options - Toolbars** is activated and the cursor (arrow) is placed on an icon without clicking, the function's designation opens. Also, a short description of the function is given in the status line at the bottom of the window.

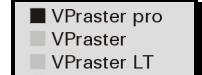
Functions that cannot be activated in the program's current status appear "grayed"- whether as an icon or as a pull-down menu command.

Status Display

There is a **comment box** at the lower screen margin showing the appropriate **activated function** with references to its meaning. When no function has been activated the comment box remains empty while a '**For Help, press F1**' indication opens.

Using the Mouse

When positioned in the window's workspace, the mouse pointer normally opens as a **crosshair**; when moved to the menu bar, the icons or the status bar, it opens as the **standard windows cursor**.



A triple **white frame box instead** of the standard crosshair indicates, that with the **next** mouse click this area will be zoomed in to scale 1:1 in order to allow a precise positioning of the next point (click).

Selecting Vector elements in graphic mode can be done in three different ways:

- **Clicking:** Click on the respective element within the cursor's snapping range.
Only one element will be selected per click. When only **one** vector element is selected it is displayed bearing **handles**.
- **Window:** You select elements inside a rectangle by holding down the left mouse button and dragging the mouse to the **right**.
All vector elements fully enclosed by the box are selected. When only **one** vector element is selected it is displayed bearing **handles**.
- **Crossing:** This is similar to **Window**, except you move the mouse to the **left**. A box opens with a dashed outline.
All vector elements touched or enclosed by this box are selected.

The appearance of elements changes to indicate that they have been selected. Their colors may change or can appear in a brighter hue, or be highlighted as another line type.

Combined Mouse Keyboard Operation

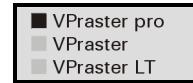
Pressing **[Shift]** while moving the mouse limits its angle of movement as follows:

- With 2 point lines including positioning (help) lines (such as text direction etc.) **only horizontal, vertical, or $n \times 45^\circ$** directions are permitted.
- With polylines the drawing direction of the **second** and all further segments is limited to only follow a multiple rectangle ($n \times 90^\circ$) with reference to the first segment. This allows the drawing of rectangle polygons having a base (1st segment) at any angle.

Holding down **[Ctrl]** while placing a left mouse click on a selected polyline or spline will add (= clicking on the desired position of the line) or remove (= clicking the vertex) a vertex.

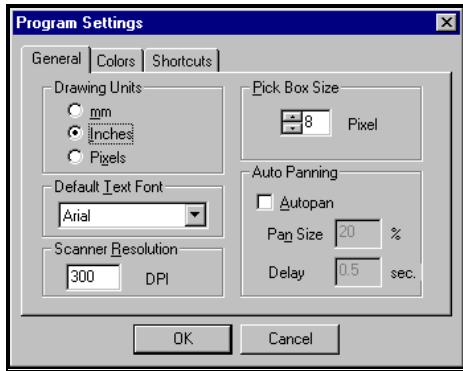
The **moving handle's** position of a selected single element can be changed by pressing **[Ctrl]** and **[Shift]** followed by a left mouse click on the desired position of the base point.

To deselect individual elements, **pick** them while holding down **[Shift]**. To cancel a selection or to deselect **all** selected vector elements, press the **right mouse button**.



Settings

With **Options - Settings** a dialog box opens to choose from or enter the system's general settings:



From these three options

- **General**
- **Colors**
- **Shortcuts**

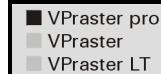
general settings such as **measuring unit**, **text font**, **auto panning**, **screen colors**, **hotkeys**, etc. can be selected in a way that allows for tailored configuration according to the user's requirements.

Display

This menu contains the functions that control the on screen display and the zooming, redrawing, and measuring functions.

Status Bar

Switches the status bar on/off. When switched on, this is indicated by a check mark next to the item in the menu.



Raster [F4]



This function toggles the display of raster data on and off. When you load a raster file, the display of raster data is enabled automatically. This is indicated by a check mark next to the item in the menu.

Vector [F5]



This function toggles the display of vector data on and off. When you load a vector file the display of vector data is enabled automatically. This is indicated by a check mark next to the item in the menu.

Zoom

All zooming functions are contained in a submenu; they can also be selected via icons.



Extents

The drawing is displayed in full. Its center is mapped to the center of the display.



Window

When you select this item you can define the window size by picking points with the mouse.

First click

= picks the first corner of the window.

Second click

= defines the window size and zooms the drawing in the window.



Pixel

1:1 pixel zoom. Each raster pixel is represented by one dot on the screen.



In [+]

This option zooms in incrementally to the maximum pixel viewing level while maintaining the viewing center point.



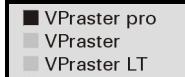
Out [-]

This option zooms out incrementally maintaining the screen center point in view, if possible.



Previous

This option lets you work your way back through previous zoomed views. The program remembers a maximum of 32 views. It does not recall pan operations.



Pan [Cursor Keys]

Using the **scroll bars** on the bottom and right window margin or with the sub-menu commands the image display can be moved in x- and y- orientation.

Drawing Aids



This icon or **Options - Drawing Aids** will show the dialog box **Drawing Aids**. They serve to activate and specify the drawing aids **Grid**, **Coordinate Snap**, and **Raster Snap**.

Grid [F7]



The grid specified in the menu **Options - Drawing Aids** can be switched on/off with this icon or using **[F7]**.

Coord Snap [F9]



The coord snap specified in the menu **Options - Drawing Aids** can be switched on/off with this icon or using **[F9]**.

Raster Snap [F11]



The raster snap specified in the menu **Options - Drawing Aids** can be switched on/off with this icon or using **[F11]**.

Vector Snap [F8]

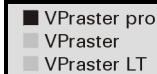


The vector snap specified in the menu **Options - Drawing Aids** can be switched on/off with this icon or using **[F8]**.

Polygon Select [F6]



Allows the selection of elements inside a polygonal area. Switches off mouse select functions "Pick", "Window", and "Crossing" while "**Polygon Select**" is switched on.



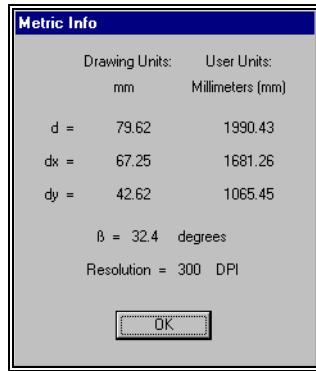
Redraw [Ctrl + R]



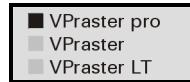
This option causes the display to be redrawn using the current data.

Distance [F2]

Pressing this key enables measurement of the distance and angle between two mouse click points using a phantom line. After the second point is set, measurement information is displayed inside a pop-up box. The **drawing unit** and **scan resolution** parameters are used for calculation, as determined by the DPI of the drawing and the base units set in the **Settings**. All length measurements are also displayed in the **User Units (user coordinate system)**.

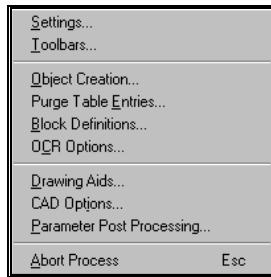


You can also use this function to measure parameter values that depend on drawing data. You click the parameter field and select the **Distance** (or **Angle**) function by pressing **[F2]**. The result is transferred directly to the parameter field and displayed there.



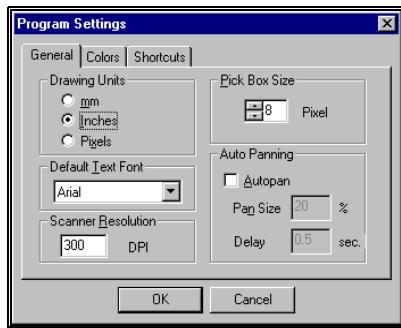
Options

General system settings, definitions, and parameters are determined and saved here. Additionally, the parameter panels controlling vector post processing can be loaded here.



Settings

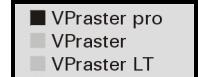
A dialog box opens where you can select and enter different system settings:



General Tab

Drawing Units

You can choose **mm**, **inches**, or **pixels**. The drawing units you select determine how the raster image will be interpreted in terms of units of measure. The units have an effect on the X/Y coordinate system and all values and parameter settings that depend on them.



Default Text Font

Selection of the **default text fonts** for creation of text styles. All existing and scaleable **True Type Fonts** in your Windows system can be chosen.

Default Font: Arial

Scanner Resolution

A raster file's resolution is detected and displayed whenever it is loaded. When restarted or after the **New** command the program defaults to the value set in the **Image Tab**.

Pick Box Size

This setting controls the size of the cursor square box used when selecting elements (pick area).

Default: 8 [pixels]

Auto Panning

With **Autopan** switched **on** the system automatically pans the view while drawing a new entity and thereby getting close to the border of the work space.

The parameters **Delay** and **Pan Size** define the delay time and the percentage of the current view to be panned respectively.

Default: off

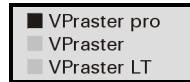
Default Pan Size: 20 [%]

Default Delay: 0.5 [sec]

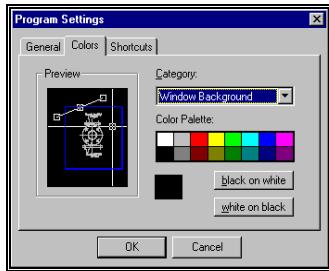
Color Tab

These screen colors can be user set:

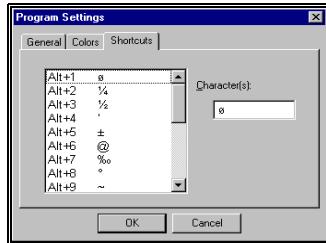
	Screen color: white on black	Screen color: black on white
• Window background	(black)	(white)
• Raster background	(black)	(white)
• Raster foreground	(light gray)	(black)
• Crosshair	(green)	(black)
• Image Border	(blue)	(black)
• Move Grip	(black)	(white)
• Other Grips	(black)	(white)



The **System Default** values (shown in brackets) can be re-activated when clicking on the **white on black** and **black on white** buttons respectively.



Shortcuts Tab



For frequent insertions, you can set up to 24 ASCII character strings as character shortcuts, which are not available from a direct keyboard entry. While entering or correcting text strings use [Alt + 1] thru [Alt + 9] and [Alt+A] thru [Alt+O] to read them back. (See also **Appendix A**)

Default shortcuts: See above Dialog Box



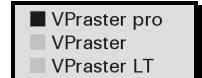
For Advanced Windows Users:

You can also change the keys for reading back your special characters. Use the registry editor (regedit.exe in your windows directory) and search for the key:

HKEY_CURRENT_USER\Software\softelec\VPraster pro\vp\Shortkeys

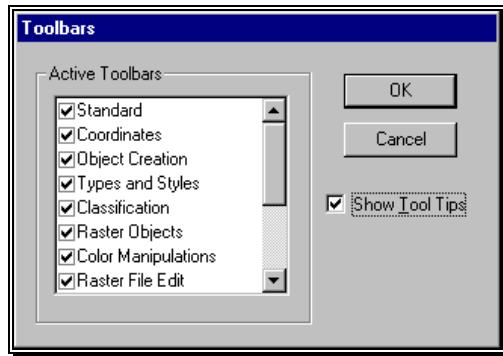
Modify the key names in the **Map** (erase the old name and then enter a new one). All modifications you made to the key names imply appropriate modifications in the **Special Keys** with key values from 1 to 24.

If you are not familiar with modifying the Windows' registry, we strongly advise you not to attempt the above procedure.



Toolbars

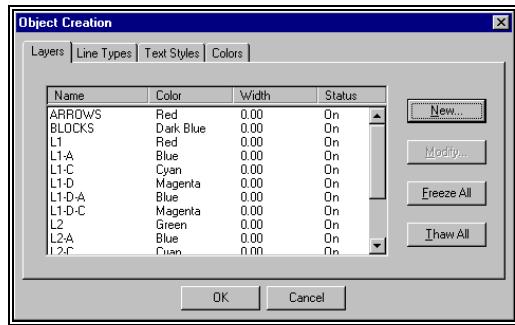
When activated the following dialog box opens for selection of various toolbars to be displayed:



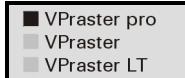
When clicking on the check box **Show Tool Tips** and putting the cursor on the respective icon the functions' descriptions will be displayed.

Object Creation

The following dialog box appears.



Layers, **Line Types**, **Text Styles**, and raster elements' **Colors** can be defined or created for further processing. They will stay permanently available when saved as a prototype drawing. Once they have been created their names cannot subsequently be changed. Unused entries can be deleted with **Options - Purge Table Entries**.



Layers Tab

Name, color, line width, and status can be defined or changed.

Default layers: L1, L2, and L3

Width

Gives the displayed width of lines. **Width 0.00** means that these elements will always be displayed in a width of one screen pixel no matter what zoom factor has been set. (This is a common representation of CAD vectors, since their actual line width for plotting is classified by color.) Other width settings are possible.

Default value: 0.00 [mm, inch]

Status [on/off]

When switched off elements in these layers will not be displayed. New elements, however, can be drawn (invisible) in or transferred to these layers.

Line Types Tab

Solid, Dashed, and Dash Dotted line types can be created or changed. At least the line type **SOLID** must exist.

Default line types: SOLID, D1, and DD1

Text Styles Tab

Allows for optional creation and modification of different **Fonts**, **Text Heights**, and **Height/Width Relations**. At all times, **T1** must be available.

Default text styles: T1, T2, T3, T4, T5, and T6

Default text font: As set in *Options - Settings*

Colors Tab

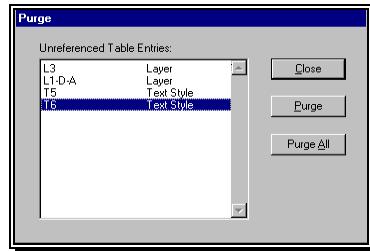
When editing raster data the following elements' display colors can be defined here. Brackets show their **default settings**:

- **Draw Objects** (red)
- **Erase Objects** (blue)
- **Holes** (red)
- **Speckles** (green)

■ VPraster pro
■ VPraster
■ VPraster LT

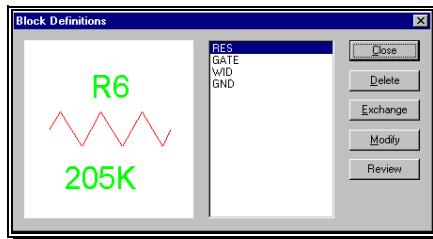
Purge Table Entries

A dialog box opens for purging of created but unused **layers**, **line types**, **text styles**, and **block definitions**.



Block Definitions

When activated, a dialog box opens listing all blocks saved in the current file including their graphic scheme. The block definitions can be **erased**, **exchanged** by others, **modified**, or **attributes** can be **attached** to them.

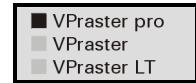


Delete

A block definition will be automatically deleted if it is not used by a block in the loaded file.

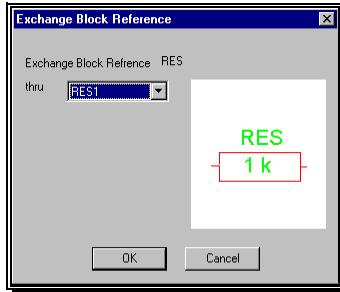
When the block definition is used by a block in the loaded file the following selection is available:

- "**Yes**" deletes the block definition and all its blocks
- "**No**" deletes the block definition; all blocks, however, will be exploded to their basic elements ("origin")
- "**Cancel**" cancels the delete command



Exchange

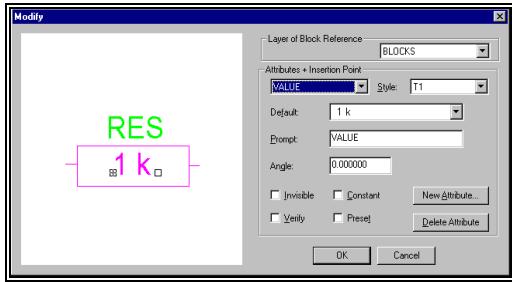
The selected block definition can be exchanged by any other existing block definition.



After **OK** and **Close** all blocks of the former block definition in the current file will be exchanged by the "new" block definition. For attributes bearing the same name the former values will be assigned. For all others the attribute definition's default values are valid.

Modify

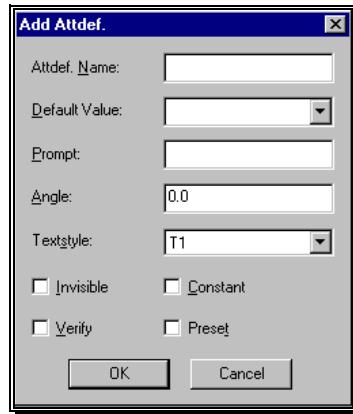
Block definition layer, insertion point, and, when existing, **attribute definitions** can be displayed and modified.



The insertion point can be moved with the mouse. It automatically snaps to cross points (intersections). If attributes have been attached - selection with **Attributes + Insertion Points** - the insertion point, angle, and parameter can also be modified for each attribute.

When **New Attribute** is selected another dialog box opens to enter attribute specification corresponding with those of AutoCAD.

■ VPraster pro
■ VPraster
■ VPraster LT



Instead of using only "one" **Default Value**, there are six predefined **Default Values** available in a combo box:

@Circumference	Calculates the circumference of the block
@Area	Calculates the area of the block
@Angle	Assigns the block insertion angle
@Y-Position	Assigns the y-coordinate of the block insertion
@X-Position	Assigns the x-coordinate of the block insertion
@Name	Assigns the name of the block

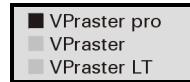


These values will only be active and displayed in an exported vector file (DXF, IGES, DWG, DGN).

An attribute can be assigned as:

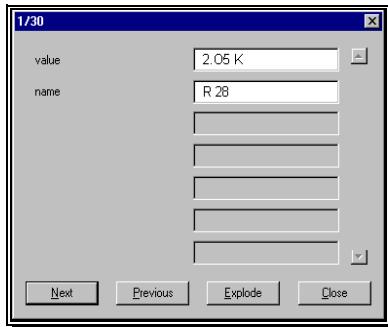
- **Invisible** Attribute will not be displayed in block
- **Constant** AutoCAD Flag: Attribute value cannot be edited or positioned in block
- **Verify** AutoCAD Flag: here of no significance
- **Preset** AutoCAD Flag: here of no significance

When attributes exist, they can be selected and modified individually or can be erased with **Delete Attribute**.



Review

All blocks in the current file can be edited. They will be displayed successively with their attributes:



Clicking **Next** or **Previous** switches to the next or previous block.

Explode will restore those elements formerly replaced by the block (by symbol search or by **Combine to Block**).

Close exits from function.

See also **Section 12**.

OCR Options

Recognition Level allows the setting of a tolerance threshold to define the acceptance level for each recognized character. A character having a lower level will be rejected and displayed as question mark instead. Experimentation for drawing extremes may be required. However, please do not expect the OCR of poor text to be improved.

Range: 0 thru 99%

Default: 36%

Character Set specifies the recognized letters or digits.

The text recognition can be customized to specific requirements in a drawing. Selection options include:

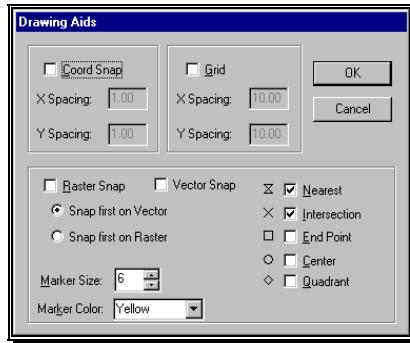
- Any European language with definable special characters
- Digits and definable special characters only. Handwritten characters optional.
- Definable special characters only.

<input checked="" type="checkbox"/>	VPraster pro
<input type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Drawing Aids



A dialog box opens for selection and value input.



Coord Snap [on/off]



After activation (click on check box) enter the values for x- and y-spacing. The values refer to the **user coordinate system**.

Default: $x = y = 0.1$ [mm]

Grid [on/off]



After activation (click on check box) enter the values for x- and y-spacing. The values refer to the **user coordinate system**.

Default: $x = y = 5$ [mm]

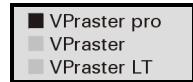
Snap Mode

There are two **Snap** choices:

- **Raster Snap**
- **Vector Snap**

If both are activated the priority snap function has to be defined.

Default: **Snap first on Vector**



There are five different snap modi available:

- **Nearest** snaps to the nearest middle point of the element.
- **Intersection** snaps to the nearest intersection of the element.
- **End Point** snaps to the nearest end point of a element.
- **Center** snaps to the center of the nearest circle or arc.
- **Quadrant** snaps to a quadrant (0°, 90°, 180°, 270°) of the nearest circle or arc.

The sensitive area of the **Raster Snap** (about. 200 by 200 pixels at the present mouse position) is fixed preset to guarantee the optimal usability with a maximum of speed.

While using the snap the active mode can be change clockwise to a different snap mode with **[TAB]**.

The different snap modes are displayed with the symbols shown in the dialog box.

With **Marker Size** and **Marker Color** the symbols can be modified accordingly.

Default: **Marker Size :** **6 pixels**
Marker Color: **Yellow**

The status bar on the right displays the actual settings of the snap function. The different colors of the snap symbols, which represent different snap modes according to the dialog, have the following meaning:

- **Grey** snap mode is turned **off**.
- **Black** snap is mode turned **on**, but this snap type is not possible at the current mouse position.
- **Green** snap mode is turned **on** and this snap type is possible at the current mouse position. Use **[TAB]** to select one of the green marked snap types for activation.
- **Yellow** the activated snap type is displayed. It appears also on the drawing close to the mouse position if the snap can work.

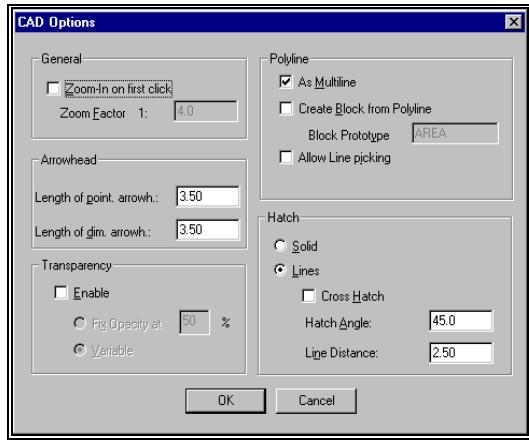
A particular snap mode can be turned **on** or **off** by clicking on the respective symbol in the status bar. A double click pops up the **Drawing Aids** dialog.

■ VPraster pro
■ VPraster
■ VPraster LT

CAD Options



A dialog box opens for selection and value input.



General

The following settings apply to all drawing functions.

Zoom-In on first click [on/off]

In **on** position while in the drawing mode the software zooms in on the first mouse click of a set point for more precise positioning (second mouse click).

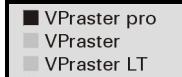
Zoom Factor specifies the factor of zooming in from the current zoom state.

Default: off

Default Zoom Factor: 1 : 4

Transparency

Transparency is not available in **VPraster pro**.



Polyline

As Multiline [on/off]

In **on** position a new polyline will be drawn only of independent 2-point lines. Each line can be assigned to different layer, color, and linetype while drawing.

Default: off

Create Block from Polyline [on/off]

After drawing a polyline this polyline becomes a block. The **Block Prototype** is a dummy block reference (not the geometry!) from which all its attributes are copied to the block. The default block prototype **AREA** for example has the attributes CIRCUMFERENCE and AREA with the default values @Circumference and @Area assigned to it. These attribute values are automatically calculated.

User defined Block Prototypes can be created with other attributes.

Default: off

Default Block Prototype: AREA

Allow Line Picking [on/off]

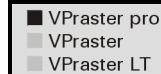
When activated existing lines or polylines can be picked which then become a vertex or vertices of the new polyline.

Default: off

Arrowhead

The size of either a **Pointing Arrowhead** or a **Dimension Arrowhead** can be defined. Values can be entered according to the selected drawing unit. The new values only relate to redrawing of these elements.

Default: 3.50 [mm], 3.50 [mm] = 1.38 [inch]



Hatch

Solid

The hatch pattern is formed by a number of solids. This option allows for the filling of vector areas.

Lines

A normal line pattern will be generated according to the selected option. **Cross Hatch** can be switched **on** or **off**. In **off** position the standard hatch pattern is on.

Default: off

The values **Hatch Angle** and **Line Distance** specify angular direction and density of the hatch.

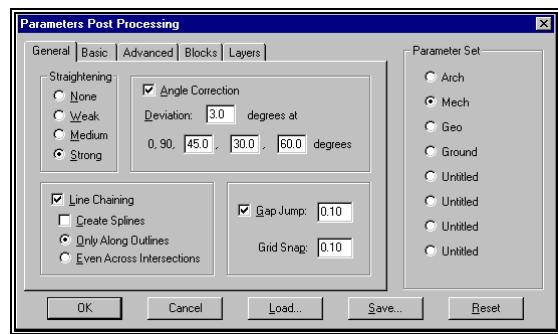
Default Angle: 45°

Default Distance: 2.5 [mm] = 0.1 [Inch]

Parameter Post Processing



A dialog box opens to choose from parameter sets for automatic vectorization post processing or to load, modify, and save individual parameter files. Detailed information for the proper setting of these parameters can be found in the Vectorization section, on **Section 10**.



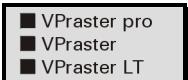
Abort Process [ESC]

Will end any active running process.

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Section 5

This section applies to:



Operation: Hybrid Editor for Raster/Vector Data

General Information



All editing functions described in this section operate on any loaded raster image. This means that you are **not** limited to the **Active Image**.



All AutoCAD entities can be **rasterized**. Thus, you can use all of AutoCAD's drawing/constructing functionality for editing a raster image. Since **VPraster series** uses a special plotter driver for rasterization, the line width is defined by the entity's color (i.e. the color of its layer). You can use standard layer control commands for a pre-selection of the entities to be rasterized. See **Section 4** for further information on rasterization.



When redrawing (with AutoCAD commands) or tracing raster structures **Delete Raster Background** can be used to simultaneously erase the raster data in the background. Intersections or connections will be kept.



This function is only available for B/W raster entities.



This function only works with basic AutoCAD entities, such as lines, polylines, arcs, circles etc. Higher entities, especially combined entities like blocks are not supported by the **Delete Raster Background** command.

Basic Editing Commands

Edit Raster (Functions)



Raster structures are combined to one object with **Create Raster Object** or **Create Raster Object (Erase Background)**. The resulting object is copied on top of the original raster data

Raster objects will be created as new raster images using the current AutoCAD layer and color. This way they will be saved as separate raster images when saving the drawing. Raster objects may be scaled, rotated, moved, and copied like blocks. All raster objects command are available in the menu **VP HybridCAD - Edit Raster**.

■ VPraster pro
■ VPraster
■ VPraster LT



The functions: **Erase Raster**, **Copy Raster**, **Move Raster**, and **Smooth Object** do not generate Raster Objects on top of the raster image. Instead, they modify the raster data.



Erase Raster, **Create Raster Object (Erase Background)**, **Move Raster**, and **Smooth Object** are only available with B/W images.

All raster functions may be aborted with **[ESC]**. **Undo** operate as usual.

On calling one of these raster functions the **Raster Selection** toolbar (see below) appears for selecting the appropriate raster selection mode.

■ VPraster pro
■ VPraster
■ VPraster LT

Create Raster Object



After the **Raster Selection** process the **raster object** is positioned on top of the original raster.

At the Command prompt, enter **vprobjekt**

Create Raster Object (Erase Background)



After the **Raster Selection** process the **raster object** is positioned on top of the original raster. The background corresponding to the object is deleted from the raster image.

At the Command prompt, enter **vpreobjekt**

■ VPraster pro
■ VPraster
■ VPraster LT

Erase Raster



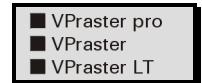
After the **Raster Selection** process the selected raster structures are deleted from the raster image.

At the Command prompt, enter **vprerase**

Copy Raster



After the **Raster Selection** process the **raster object** is positioned on top of the original raster. It can be moved, rotated, or scaled. When confirming its final position it will be copied into the current raster image.



Select Base Point <X,Y>: Specify the base point or [Enter] for the default value (center of the raster object)

Angle/Scaling/<Second Point>: Type **a** for rotating or **s** for scaling if applicable or specify new insertion point

Angle:

Angle<0.0>: Enter value, specifying the rotation angle, or press [Enter] for 0°

Scaling:

Scaling<1.0>: Enter value, specifying the scaling, or press [Enter] for scale factor 1.0

Second Point:

<Second Point >: Enter point, specifying the new insertion point, or [Enter] for the actual position

At the Command prompt, enter **vprcopy**



Copying raster areas between images with different colors will cause unexpected results.

Move Raster



After the **Raster Selection** process the **raster object** is positioned on top of the original raster. It can be moved, rotated, or scaled. When confirming its final position it will be copied into the current raster image at the new position and the first selected object is deleted.

Select Base Point <X,Y>: Specify the base point or [Enter] for the default value (center of the raster object)

Angle/Scaling/<Second Point>: Type **a** for rotating or **s** for scaling if applicable or specify new insertion point

Angle:

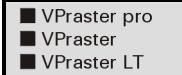
Angle<0.0>: Enter value, specifying the rotation angle, or press [Enter] for 0°

Scaling:

Scaling<1.0>: Enter value, specifying the scaling, or press [Enter] for scale factor 1.0

Second Point:

<Second Point >: Enter point, specifying the new insertion point, or [Enter] for the actual position



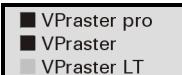
At the Command prompt, enter **vprmove**



During the selection process the selected raster structures may show interruptions at intersections with remaining entities. These interruptions do not apply to the moved or copied raster object.



Moving raster areas between images with different colors will cause unexpected results.



Smooth Object

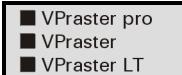


Limited raster entities e.g. line, circle, arc can be smoothed. The selected raster objects are smoothly redrawn, gaps are closed and the objects are straightened.

At the Command prompt, enter **vprosmooth**



See above.



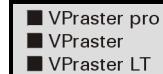
Raster Selection



Raster structures generated with any of the selection modes are displayed in the current **Object Color** (default: **green**). Repeated selection will expand the object continuously if the "+" button is active.

If the "-" button is active while re-selecting any previously selected raster entity or structure, this part will be deselected from the total selection.

Pressing the **[Ctrl]** key while selecting will change the selection mode from adding to removing and vice versa.

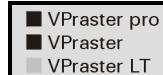


The **Undo** button or the AutoCAD **Undo** command (**u**) is available to undo the last selection step.

Clicking on the "✓" button or pressing [**Enter**] confirms the selection.



1. The raster selection modes **Select Arc**, **Select Circle**, **Select Line**, and **Select Inside Window** are only available with B/W images.
2. **De-selection** is only available with B/W images.



Select Arc



Generates an arc object through three points:

- Select First Point:* Specify start point on arc
Select Second Point: Specify end point on arc
Select Third Point: Specify third point (curvature and direction)

At the Command prompt, enter **a**

The raster structure under-laying the arc is selected. Crossing raster structures are ignored. However, when using the functions **Create Raster Object**, **Copy Raster**, **Move Raster**, or **Smooth Object**, the generated object is traced completely.

Select Circle



Generates a circle object through three points on the circle.

The raster structure under-laying the circle is selected. Crossing raster structures are ignored. However, when using the functions **Create Raster Object**, **Copy Raster**, **Move Raster**, or **Smooth Object**, the generated object is traced completely.

- Select First Point:* Specify first point on circle
Select Second Point: Specify second point on circle
Select Third Point: Specify third point on circle

At the Command prompt, enter **c**

■ VPraster pro
■ VPraster
■ VPraster LT

Select Line



Generates an individual 2-point line.

The raster structure under-laying the line is selected. Crossing raster structures are ignored. However, when using the functions **Create Raster Object**, **Copy Raster**, **Move Raster**, or **Smooth Object**, the generated object is traced completely.

Select First Point: Specify line's start point

Select Second Point Specify line's end point

At the Command prompt, enter **l**

■ VPraster pro
■ VPraster
■ VPraster LT

Select Polygon



All raster pixels inside a closed polygon are selected. Close the polygon with **[Enter]**.

With color raster images the **Pick Element** command is disabled until this raster operation is concluded.

From Point: Enter value or specify first point of polygon

To Point: Enter value, specify point, or **[Enter]** to close and finish

At the Command prompt, enter **p**

Select Rectangle



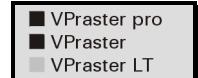
All raster pixels inside a dragged window are selected.

With color raster images the **Pick Element** command is disabled until the raster operation is concluded.

First Corner: Enter value or specify first point

Other Corner: Enter value or specify rectangle

At the Command prompt, enter **r**



Select Inside Window



Raster elements representing continuous lines, arcs, circles, etc. are selected if they are located entirely inside the selection frame. Elements which extend beyond the frame will be ignored.

Crossing raster structures are ignored. However, when using the functions **Create Raster Object**, **Copy Raster**, or **Move Raster**, the generated object is traced completely.

First Corner: Enter value or specify first point
Other Corner: Enter value or specify rectangle

At the Command prompt, enter **w**

Pick Element



The cursor is replaced with a pipette. The **Pick Element** functionality depends on the type of raster file.

Pick Raster: Specify point on raster

At the Command prompt, enter **e**

B/W Raster File

Clicking on the raster with the **left** mouse button all pixels connected to that point will be picked and hereby selected.

Pressing the **[Ctrl]** key during a picking operation will **remove** all pixels connected to that pick point from the current selection.

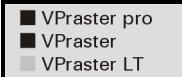
Color Raster File

Clicking with the **left** mouse button will generate a mono-colored area object depending on the environmental color pattern. Minor color variations of areas or dithered areas (color patterns) will be combined to the selection. The generated object will be selected. The target color taken from the palette is the closest color to the average of all combined colors.

Clicking on the raster again, another area will be generated using the same search pattern and the same target color. The generated object will be **added** to the selection.

Since undesired results may occur, **Undo** will reverse the last operation.

The **Select Polygon** and **Select Window** commands are disabled until the raster pick operation is concluded.



Add to Selection



If this button is pressed subsequent selections are added to the current object.

Remove from Selection



If this button is pressed subsequent selections are removed from the current object.

Undo Last Raster Selection



Undo's the last selection or de-selection command.

Confirm Raster Selection [**Enter**]



This icon or **[Enter]** ends the raster selection and proceeds in the current raster object function.

Raster Text



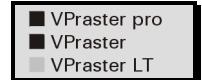
Allows for interpretation and modification of raster text in the loaded raster image.

At the Command prompt, enter **vprdstext**.

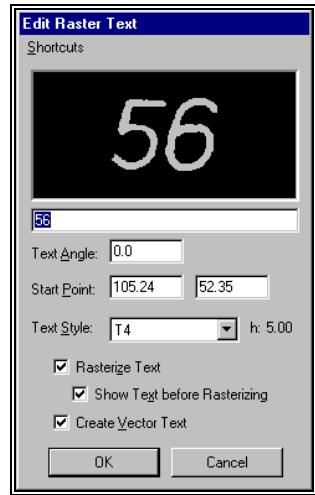
Window (3 Points)/<Rectangle>: First Corner:

Draw a rectangle (2 points) for capturing the raster text or type "w" to capture rotated raster text (3 points):

The original raster text will be selected for further processing according to the selection window. All raster information within the rectangle will be transferred to the OCR using default settings.



Then, a dialog box for text verification and modification appears:



In the dialog box you can modify the text and any of the text properties. A maximum of twenty-four special characters (if configured) are directly accessible via **[Alt+1]** thru **[Alt+9]** and **[Alt+A]** thru **[Alt+O]** or using **Shortcuts**.

If **Rasterize Text** is activated the previously selected raster structure will be deleted and the new text rasterized into the raster image.

If the option **Show Text after Editing** is on the edited text will be displayed after clicking **ok**.

Edit Text: the text can be **moved**, **rotated**, or **scaled**. Pressing **[Enter]** will first delete all raster structures previously selected with the rectangle and then rasterize the new text into the raster image.

If **Create Vector Text** is activated the new text will replace the original raster as vector representation.

■	VPraster pro
■	VPraster
■	VPraster LT

Fill Raster



Fills a raster area or removes raster structures from the image. Creates monochrome raster structures with color images.

At the Command prompt, enter **vprfill**

Select seed point: Specify point

The cursor is overlayed by a "bucket". The **Fill Raster** functionality depends on the type of raster file.

B/W Raster File

Clicking **on raster data** erases all pixels connected to that point from the raster image. Clicking **on the background** fills the entire background up to the raster border.

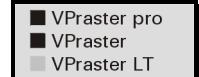
Color Raster File

Clicking on raster data generates a monochrome area under consideration of the environment. Minor color variations of areas or dithered areas (color patterns) will be combined. There are two options available for the target color for this area:

Choose color: *Select/<Automatic>*

Automatic: The target color taken from the palette is the closest color to the average of all combined colors.

Select: A dialog is displayed for selection of the target color.



Draw Raster (Functions)

There is a set of draw/erase commands for simple raster structures, such as lines, arcs, circles, etc. They are based on the standard AutoCAD drawing functions. Please refer to your AutoCAD manual for further guidance. The entities you draw/erase will directly modify the raster.



The current AutoCAD linetype settings are ignored. To draw raster entities with a linetype use the standard AutoCAD commands and then **Rasterize** these entities.



Drawing occurs with the specified pixel width. By clicking on the **Dynamic Width** icon, the line width can also be detected or calculated by clicking the raster element. This assigned line weight remains fixed until a new width is detected.

This function is only available for B/W raster files.

At the Command prompt, enter **vprpickwidth**



Due to the roughness of a raster element the dynamic width derived from it may differ by 1-2 pixels.

With colored images the current AutoCAD settings for layer/color are used.

Draw Line



Draws a raster line with the specified line weight.

At the Command prompt, enter **vprdline**

Draw Polyline



Draws a raster polyline with the specified line weight.

At the Command prompt, enter **vprdpline**

Draw Arc



Draws a raster arc with the specified line weight.

At the Command prompt, enter **vprdarc**

■	VPraster pro
■	VPraster
■	VPraster LT

Draw Circle



Draw a raster circle with the specified line weight.

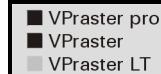
At the Command prompt, enter **vprdcircle**

Draw Rectangle



Draws a raster rectangle with the specified line weight.

At the Command prompt, enter **vprdrectang**



Erase Raster (Functions)

The raster structure underlying the drawn entity is erased while intersecting or connecting structures will be kept.



These functions are only available for B/W images.

Erase Line



Erases a raster line.

At the Command prompt, enter ***vpreline***

Erase Polyline



Erases a raster polyline

At the Command prompt, enter ***vprepline***

Erase Arc



Erases a raster arc.

At the Command prompt, enter ***vprecirc***

Erase Circle



Erases a raster circle.

At the Command prompt, enter ***vprecircle***

Erase Rectangle



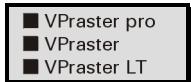
Erases a raster rectangle.

At the Command prompt, enter ***vprerectang***

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Section 6

This section applies to:



Operation: Raster File Editing

General Information

The sub menu **VP HybridCAD-Raster File Edit** contains editing functions only applicable to raster data. They provide functions for clean-up of scanned raster data. All these functions apply to the **Active Image**.

Raster Functions

The following editing functions, affecting always the entire file can be run individually:

Function	AutoCAD command
• <i>Cut Window</i>	<i>vprcutwindow</i>
• <i>Crop</i>	<i>vprcrop</i>
• <i>Deskew</i>	<i>vprdeskew</i>
• <i>Invert</i>	<i>vprinvert</i>
• <i>Rotate</i>	<i>vprrotate</i>
• <i>Horizontal Mirror</i>	<i>vprhmirror</i>
• <i>Vertical Mirror</i>	<i>vprvmirror</i>
• <i>Remove Speckles</i>	<i>vprspeckles</i>
• <i>Smooth Raster</i>	<i>vprssmooth</i>
• <i>Scale</i>	<i>vprscale</i>
• <i>Auto Cleanup</i>	<i>vprclean</i>

Auto Cleanup



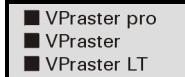
This icon or **VP HybridCAD – Raster File Editing - Auto Cleanup** starts an automatic despeckling, filling raster holes, and deskewing of the loaded raster file. The maximum size of the removed speckles or filled holes is 128 pixels. Speckles with a regular outline (e.g. dots, dots of dashed lines, decimal dots) will not be removed.

Deskewing is performed by selecting a major vertical line of the raster image.

At the Command prompt, enter ***vprclean***



Auto Cleanup of poor drawings, e.g. weak, thin, and fragmented raster elements will show additional degeneration of the image due to despeckling. Always insure of good quality scans.

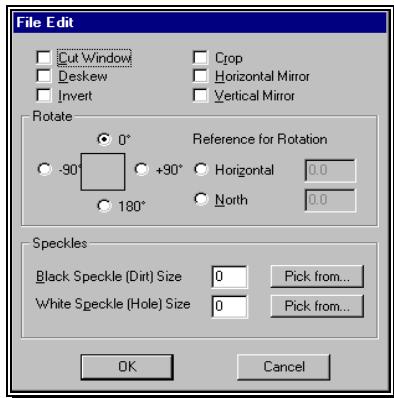


All



This icon and **VP HybridCAD - All** opens a dialog box where several editing functions for sequential processing can be activated.

At the command prompt, enter **vprufe**



Cut Window



This function cuts a section from **Active Image** for selective editing and conversion. You determine the desired image area by dragging a window with the mouse. The new raster file will contain information according to the selected window frame.

At the command prompt, enter **vprcutwindow**

Crop



This function erases all raster information from the **Active Image** outside of the selected window size. The original raster file size (length x width in pixels) remains.

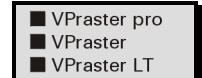
At the command prompt, enter **vpcrop**

Deskew



This function lets you correct small skew errors that frequently occur during scanning. The whole file will be aligned according to a **horizontal** or a **vertical reference line**.

At the command prompt, enter **vprdeskew**



When you choose this function the cursor appears with a triple **frame box** which you position at the first starting point of the reference line you wish to define. When you click on the first point, the area is enlarged to a ratio of 1:1. The standard screen cursor appears allowing you to accurately pick the starting point of the magnified reference line with a mouse click. After doing this, the program zooms back to the extents, and the cursor returns with a triple frame box again. You apply the box in the same way to pick the end point of the reference line. The program immediately begins the transformation of deskewing the image. A progress indicator is displayed. If deskewing is unnecessary, the program displays a corresponding message.



The **Raster Snap** function [**F8**] should be switched off for optimum deskewing accuracy.

Invert



This function inverts the **Active Image**, e.g. white pixels become black and vice versa; it is available for B/W, gray scale, and colored raster files.

At the command prompt, enter **vprinvert**

Rotate Arbitrary

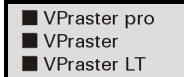


This function rotates the **Active Image** through any angle you wish. A dialog box appears where you enter the rotation angle and select the basis of rotation.



You specify the angle by entering the value via keyboard (absolute rotation angle). **North** will rotate the raster file in such a way that the reference line is vertical after rotation. **Horizontal** will rotate the raster file until the reference line becomes horizontal.

At the command prompt, enter **vprrotate**



Entry: keyboard
Range: - 360° thru +360°
Default: 0°

Horizontal Mirror



The raster file is mirrored across the vertical axis (y-axis).

At the command prompt, enter **vprhmirror**

Vertical Mirror



The raster file is mirrored across the horizontal axis (x-axis).

At the command prompt, enter **vprvmirror**

Remove Speckles (B/W files only)

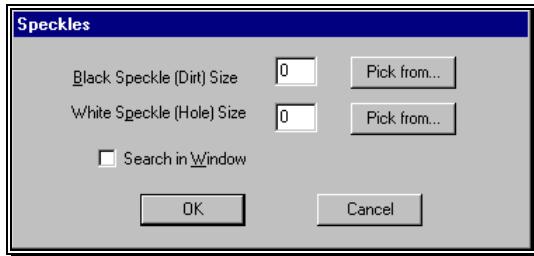


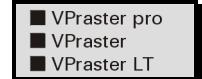
This function **clears** artifacts (unwanted isolated clusters of pixels, e.g. "dirt") from the raster data or **fills** in any vacant pixels (holes) in the raster. A dialog box opens in which you set the number of pixels to remove or add. The speckle and/or hole size can also be set by picking a sample speckle and/or hole from the raster file.

At the command prompt, enter **vprspeckles**



The **Remove Speckles** function is only available for B/W raster files.





Black Speckle Size

Here you specify the number of pixels that constitute the maximum size of artifacts you wish to search for. The formation of an artifact is not important, but the cluster must be isolated from touching larger raster objects.

Entry: **keyboard or via button 'Pick from ...'**

Range: **1 thru 128 pixels**

Default: **0**

White Speckle Size

Here you specify the maximum number of pixels required to fill a hole. The hole must be circumferenced by active pixels otherwise the hole will not fill.

Entry: **keyboard or via button 'Pick from ...'**

Range: **1 thru 128 pixels**

Default: **0**

Search in Window [on/off]

If you enable this option, only the window in question will be despeckled.

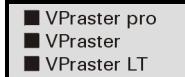
OK starts the function or waits for pulling up a window. A progress bar indicator is displayed.

Once the operation is completed, the specific raster elements detected are displayed as follows:

Dirt = **green**
Holes = **yellow**

If the program has selected raster elements that you do not wish to remove, even if they do not exceed the sizes defined in the **Black Speckle Size-** or **White Speckle Size** settings (e.g., the decimal points in numbers), you can deselect any marked element by selecting **Delete Marker** at the command prompt and then select the elements to be removed (pick, window, crossing) and end the deselection with **[Enter]**.

With the next **[Enter]** the rasterizing process starts and removes the remaining speckles.



Smooth Raster



The **Smooth Raster** function can be activated if a B/W raster file has been loaded. The function eliminates rough surfaces and isolated pixels and is active on both black and white speckles.

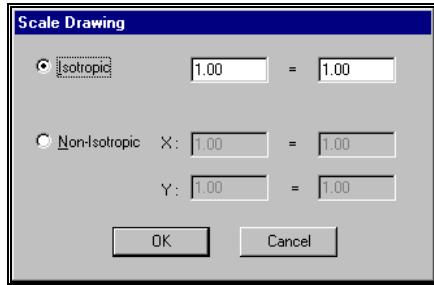
At the command prompt, enter **vprsmooth**



Scale Drawing

At the Command prompt, enter **vprscale**

Allows to scale a raster drawing in **Isotropic** or **Non-isotropic** mode. A dialog box opens to select the scaling method and to enter the required values:



When **Isotropic** mode is selected, the drawing will be scaled with equal values in x and y direction. A scale rate can be entered.

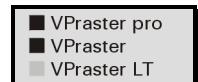
Default value: 1:1 (actual value: target value)

Non-isotropic mode allows for different scaling values in x and y directions.

Default value: (x = y) = 1:1 (actual value: target value)

Section 7

This section applies to:



Operation: Color Reduction, Color Separation, Color Classification, Filters

General

When color or gray scale originals are scanned with corresponding scanner devices, you will get very large raster files and possibly containing millions of colors. To process these files in CAD programs, it is important to optimize the color and gray scale information. This can be done either by reducing adjacent colors, combining colors, or by leveling color transitions to reduce the information for each of the remaining colors, thus making a proper interpretation possible.

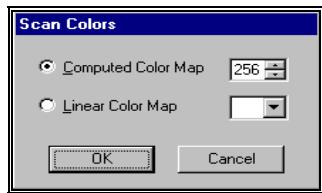
To reach this goal, **VPraster pro's** and **VPraster's** built-in scanner interface limits the number of colors to be captured to a maximum of 256 colors. This is accomplished by using a color conversion table (image palette) based on either a standard color palette or an adaptive palette created during a prescan.

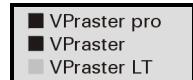
Using the color reduction process, the original total number of colors can be reduced to create bold solid colors to enhance the image as well as to reduce the original file size dramatically. The overall goal is to reduce the number of colors or gray scale levels to a total of about 6 to 16 color values.

Color separation creates separate black & white (bi-level) raster files out of the remaining or individually selected colors. These files can be processed just like any other "regular" B/W files.

Scanning Colors

After inserting an original and setting up the scanner (see your scanner manual and/or **Appendix**), the assignment of a palette can be activated or an existing palette can be selected. Otherwise a dialog box will appear after **Scan** or **Forward** to define the palette (**color map**) for the color reduction to a maximum number of 256 colors:





When choosing ***Linear Color Map*** conversion will be executed according to the standard color palette.

When choosing ***Computed Color Map*** a prescan will follow to define the existing colors in your actual original. Out of these colors an individual color palette will be set up.

In the **selection box** the desired maximum number can be specified.

The dialog box disappears with **OK** followed by the prescan and the calculation of the color palette. Then, the selected function (***Scan, Forward***) will be executed.

After every ***Stop*** action in the scan menu or when reaching the document end, the current calculated palette will no longer be valid. By repeating the scan action, a new palette will be recalculated and assigned. If you switch from ***Forward*** to ***Scan*** directly, though, the same palette will be used.

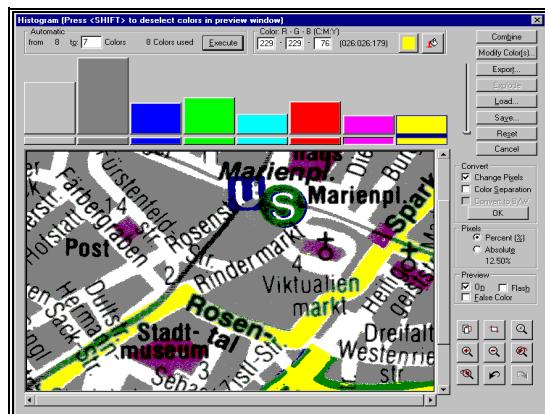
Reducing Colors / Gray Scale

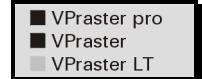


If the **Active Image** is an indexed color or grayscale raster image, select the ***Color Reduction*** command from the **VP HybridCAD-Color Tools** pull-down menu bar or click on this icon.

At the command prompt, enter ***vprreduce***

The dialog box for color manipulation appears, containing the histogram of the existing colors in the raster image (to improve the color presentation no frequency bars will be displayed for more than 48 colors).





The dialog boxes contain two main areas: The "Preview" displays the image as it will look after any step of the color reduction and the "Histogram View" shows the colors of the image.



Depending on the screen resolution, there are three different dialog boxes which are slightly different in appearance but similar in operation. The sample shown is the one for 1024*768 pixels. (See the last page of this section for other possible display resolutions).

Preview

The image display in the preview window can be changed using the three Preview options: **On**, **Flash**, and **False Color**.



In the Preview the default cursor is a pipette, which allows colors to be selected from the preview window by clicking with the left mouse button. To select more than one color you can move the mouse for a window selection of all colors enclosed.

To deselect colors from within the Preview hold the **[Shift]** key while proceeding as described above.

A context sensitive popup menu can be opened by clicking the right mouse button. The available functions are the same as those accessible through the **Combine**, **Modify Color(s)**, **Export**, and **Explode** buttons. See below for more information on these functions.

The popup menu command **Mark unused** adds all unused colors to the list of selected colors. **Cancel Menu** closes the menu without action.

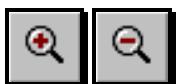
To move around the Preview you can use the scrollbars. There are several zoom commands available:



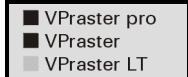
Zoom Extents shows the entire image in the preview window. This is the initial state when the dialog opens.



Zoom Window switches the cursor in the preview into a crosshair for an image area selection to zoom.



Zoom In and **Zoom Out**.



Zoom Previous shows the previous view of the image.



Zoom Next shows the view before the **Zoom Previous** state.



Zoom 1:1 switches the cursor to a magnifier glass in the Preview. Click the desired center of the view with the left mouse button.

Histogram View

In this area the image colors are represented either as a "Histogram" (if 48 or less colors remain) or as an array of buttons, with one button for each color of the current palette. The buttons are for the selection of colors (if not picked from the image) and for controlling which colors have been selected.

The histogram's column heights indicate the frequency of each color present in the original. There is also an action button below each color column. Clicking the action button adds or removes this color to or from the list of selected colors.

When the Histogram is displayed the slider on the right can be moved up and down to scale the frequency bars of the histogram. This option is intended for a better view of small frequencies.



Clicking the right mouse button and moving the mouse activates the window select mode in the Histogram View. Each color inside the selection window will toggle from selected to unselected and vice versa.

When clicking on a color bar the color's frequency in the entire image is displayed in the "Pixels" area in **Percent** or as an **Absolute** value.

Colors that are in the palette but do not appear in the image (unused colors) are displayed in different ways. In the Histogram they are displayed without a frequency bar. In the button array unused colors are indicated by a circle on the action area.

Double clicking on a color bar opens the standard Windows **Colors** dialog box for selection.



A context sensitive popup menu can be opened by clicking the right mouse button. The available functions are the same as those accessible through the **Combine**, **Modify Color(s)**, **Export**, and **Explode** buttons. See below for more information on using these functions.

The popup menu command **Mark unused** adds all unused colors to the list of selected colors. **Cancel Menu** closes the menu without action.

Automatic Reduction

The palette's total number of colors and the number of colors actually used will be displayed in the "Automatic" field. In the edit field you can enter the desired number of colors the palette should contain after the automatic reduction. After **Execute**, the image will be updated and displayed in the preview dialog window with the reduced color palette.



Undo and **Redo** will undo or redo the individual reduction steps. This way you can test the effects of reduction on a varying number of colors.



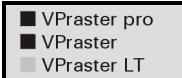
For best results, do not make a big reduction in the number of colors at one time, but instead take several reduction steps. As a suggestion, choose 32, then 16. From here, you can combine specific colors for additional reduction.

If the reduction leads to unwanted results use the **Undo** or **Reset** button and decrease the number of colors again from that point on.

Color Filling



The cursor in the Preview is changed to a fill cursor to fill areas in the image with one single color. The output color is automatically calculated. Unwanted results can be discarded using **Undo**.



Interactive Color Separation

There are two ways for picking a color: Either by clicking on the respective button in the Histogram View or by clicking on an image pixel in the Preview. In the latter, the cursor appears as a pipette. The selected color is indicated by the inverse (pressed) button state in the Histogram View. The color selected first will be the "Target Color", thus receiving a highlighted frame and a flashing action area.

To deselect a color click on the corresponding color button or click on a pixel of the respective color in the Preview while pressing the **[Shift]** key.

If the Target Color is deselected, all other selected colors will be deselected.

The "Color" edit fields display the target color's RGB values, the CMY values are indicated in brackets. When a single color has been picked, the color's frequency in the original will be displayed in the "Pixels" field. When several colors have been picked their frequency sum will be indicated in **Percent** or in **Absolute** values.

Preview

The preview options apply to the Preview window.

On activates the preview. Selected colors are marked in the Preview with the Target Color.

Flash toggles the view of the selected colors on and off automatically.

For better distinction, **False Color** can be selected which shows the selected colors not in the target color but in a special complementary color.

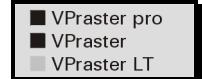
Combine

Picking several colors and then combining them to one identical color (**Target Color**) will reduce the number of colors.



The **Target Color** icon indicates the color the selected colors will be combined to. Clicking on the icon a new target color can be specified in a color dialog box. The icon will appear in pushed state with a highlighted frame. When in pushed state a repeated click on the icon will cancel the entire selection.

Combine will generate a combination of the selected colors to the Target Color. The Preview will be redrawn with the modified color palette. **Undo** and **Redo** will undo or redo the individual modification steps.



Modify Color(s)

Using **Modify Color(s)**, selected colors can be changed to another color, provided that this color is not used in the original. If more than one color has been selected, a new color value will be requested for each target color prior to executing the modification. A double click on the frequency bar will also call up the color modification dialog box.

When the **Target Color** icon is in pushed state only the Target Color will be changed.

To select a new color, the standard Windows **Colors** dialog box opens.

Undo and **Redo** will undo or redo the individual modification steps.

Entering new RGB values directly in the edit fields, **Red**, **Green** and **Blue** also can modify the target color. However, these modifications cannot be undone with the **Undo** option once executed!

Export (Color Separation)

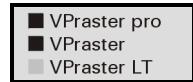
Export will generate an individual B/W raster file for each of the selected colors. After entering a file name all files will be assigned a three-digit counter and saved in **TIF** format. The colors will be numbered from left to right and from top to bottom according to the Histogram View.

Explode

The selected color is exploded into its colors from the previous reduction step (automatically or manually). The colors remain selected and the **Target Color** shows the combined color. Unwanted colors can be deselected as described above.

Load

Load opens the load dialog for loading a color reduced palette (VP Palette). Included in this file are the image's original and reduced palettes. You can only load a color reduced palette if the original palette and the saved reduced palette match. In case you want to apply a certain color reduced palette to several scanned images you always have to scan to the same palette in order to use this feature.



Save

Save opens the save dialog for saving a color reduced palette (VP Palette). You can load the palette with **Load** in this dialog, in the **Scan** dialog, or with **Raster-Color-Load Palette**.

Reset

Reset will undo all modifications on the color palette and on filled areas. It restores the original palette file. In this case **Redo** will not be available.

Cancel

Cancel will close the dialog box without changes to the original image.

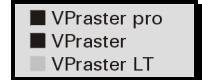
Convert

The conversion changes the original pixel values of the image if you choose the option **Change Pixels**. This way not only the palette but every pixel in the image can be changed. You should switch this option off if you only want to change the image's palette. When saving a color reduced palette you can conserve the original image and read it back with **Raster-Color-Load Palette**.

The **Color Separation** function is available from 16 colors or less. It generates an individual B/W raster file for each remaining color. This file will be saved with a base name (user defined) and an appended two-digit automatic counter.

If the palette has been reduced to only two colors the original can be converted directly into a B/W raster image with **Convert to B/W** providing further editing.

OK closes the dialog box and all modifications on the color palette will become permanent. Hence, there is an option to **Export** colors before closing the dialog box with **Cancel**. This way colors can be separated into multiple B/W raster files without any modifications in the original.



Color Classification

General

The classification of colors is an alternative method to reduce the number of colors (i.e. the amount of data) in an image – especially of color patterns. The process as featured in **VP HybridCAD** software and described in this chapter is a combination of user interaction and automatic routines.

The principal concept of color classification is based on combining color patterns scattered over an image into a single color automatically. This is based upon probes taken from the image and then extracting the color pattern information into "class" information.

Imagine a scanned map having many shades of blue colors that represent water areas. In order to reduce the number of these different blue tone patterns, they will be gathered, then "classified" automatically and assigned as a single class with the color BLUE. At the end, this color will be given a title "nickname" to symbolize "water areas" in the map. Hence, now the color graphic information has been simplified, such as "blue" for water, "brown" for land, "green" for vegetation, "red" for streets, "black" for text, and so on.

To attain a proper automatic classification, you need to initially set the program to the colors you want to assign as these color group classes. This is done by assigning color probes from representative areas in the image. The program will then process and generalize this information to be used for the entire image. The operational steps are described as follows.

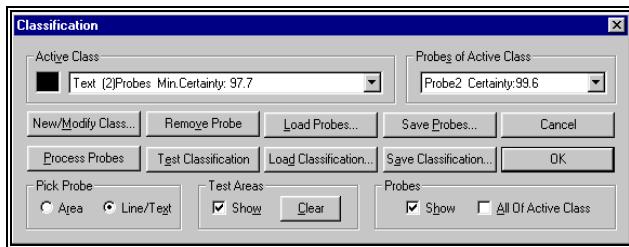
Classification

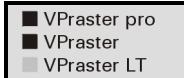


Select a color or gray scale raster file as **Active Image** and call **Classification** from the **VP HybridCAD-Color Tools** menu or click this icon.

At the command prompt, enter **vprclassify**

The **Classification** dialog appears.





Pan and zoom commands can be used transparently.

The first step to classify an image is to define the desired classes. Select **New/Modify Class** from the dialog. In the upper section of the appearing dialog enter a name of the class and assign a color (target color).

Image classes can be defined like this (sample):

Class	Color
<i>buildings</i>	<i>white</i>
<i>streets</i>	<i>black</i>
<i>parks</i>	<i>green</i>

You can enter up to 16 different classes (colors). Choose the target color of the class according to the image's color pattern or assign any color except magenta, as this color is used internally by the program and lead to confusion by the user. There is no interaction between the color pattern to be classified and the target color!

The second step is to window or individually pick representative colors probes for the class from the image. With the combo box **Active Class** you select the class to which the probes will be assigned.



If you take more probes for a particular class, the classification quality can improve. This is especially important if color patterns vary in different areas. It is recommended that you do not reduce colors until you have completed classification of colors. This will assure best construction of the color classification.

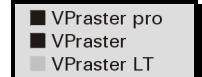
Pick Probe



In **Pick Probe** select whether to take an **Area** probe (a bucket cursor appears) or **Line/Text** structure probe (a pipette cursor appears).

To pick a probe click with the left mouse button on the image. The probe will be displayed in magenta (hence, do not use magenta as a class color). If the picked probe is not appropriate for a specific class click the right mouse button to discard it or click on the button: **Remove Probe**.

Pick one or more probes for each class.



Process Classification

Continue with **Process Probes** until all assigned probes have been taken.



The generated color classification is likely to generate bad results if the progress bar appears for a very long or a very short period of time.

After a color classification has been generated you can test it in a suitable area of the image with **Test Classification**. The dialog disappears and the program prompts for a window selection for testing the classification in this area.

The results will be displayed. You can cancel the selected test areas by pressing **Test Areas - Clear** or you can suppress them temporarily with the **Test Areas - Show** checkmark switched off.

For a better view, you can also switch off the display of previously picked probes with **Probes - Show**. The function **Probes - All Of Active Class** displays all picked probes of the active class in the highlight color.

After generating a classification, hit rate values (in percent) are displayed in the **Active Class** and in the **Probes of Active Class** listings. You can review the probes with low hit rate values (which are most likely the ones to prevent good results) by selecting them with **Probes of Active Class**. The active probe is displayed in magenta. Discard it with **Remove Probe** and pick (a) new probe(s) instead.

Probe1 Hit Rate: 98.5	
Probe2 Hit Rate: 96.2	
Probe3 Hit Rate: 97.6	
Probe4 Hit Rate: 66.2	

Generate a new classification by pressing **Process Probes** in order to assign the new probes to the classification. When the classification suits your needs you can save it with **Save Classification**.

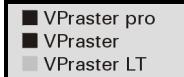
The classification can now be applied to other images of the same type by loading it with **Load Classification**.

OK processes the entire image with a generated or loaded Classification.

Cancel leaves the dialog without prompting to save a generated classification!

Load Probes loads probes, but the picked areas will not be displayed.

Save Probes saves the picked probes to disk.



Filter Functions

With filter functions, you can improve the image quality of a scanned original before starting with color reduction or before vectorizing B/W originals. When filters are used originals should still contain 256 colors or 256 gray scales.

Filter Raster Image



From the **VP HybridCAD-Color/Filter** menu select **Filter Raster Image** (this function is only available, if the **Active Image** is a color and gray scale image).

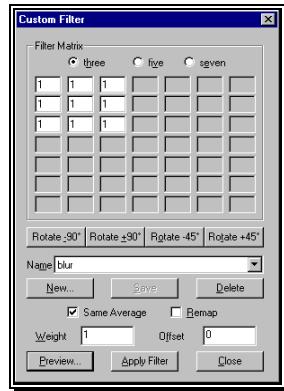
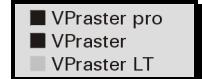
At the command prompt, enter **vprfilter**

The application of filters in image processing is a very complex subject that cannot be described in detail in this manual. Only those with color processing experience should work with the items in this section, since unpredictable and unwanted image manipulations are likely to occur otherwise!

Preview opens a window to view how the selected filter affects the actual image. Use the scrollbars if available, to move around the 1:1 scaled view of the image.

Close returns to the filter settings dialog. The progress bar indicates the filtering process.





This dialog box allows for several filter options to be defined for the current original. With **three**, **five**, and **seven** you can switch between the available filter sizes. If a matrix size applies to a filter it will be listed in the list box. Otherwise the filter will not be listed and the matrix elements receive a **0** default value.

Rotate - 90° rotates the displayed filter a quarter-turn clockwise.

Rotate +90° rotates the displayed filter a quarter-turn counter clockwise.

Rotate - 45° rotates the displayed filter an eighth-turn clockwise.

Rotate +45° rotates the displayed filter an eighth-turn counter clockwise.

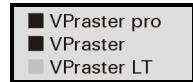
The selection list provides for the selection of the available filters.

New opens a dialog box where a filter name that does not yet exist in the matrix size's setting may be entered. No wildcard character (*) will be accepted in the name. If there are more than 13 characters entered the name will be truncated to this length automatically. The list box will now display the name with a * character at the end, meaning the filter has not yet been saved.

Save will save the current filter to the registry. The * character disappears.

Delete removes the displayed filter. Filters bearing the same name will be overwritten, except those with different sizes.

The **Same Average** check box provides for a selection whether the filter's coefficient should be weighted in a way that the average value in the original remains unaffected. This option has no meaning for filters bearing a coefficient sum of 0. For this kind of filters the image's dynamic range will be shifted to enable the display of possibly generated negative values.



Choosing **Remap** a new image palette will be calculated after filtering. Otherwise the filtered image will be displayed with the prevailing palette.

Weight controls the filtering result being multiplied with the entered value, thus stretching or compressing the generated result (contrast).

Offset moves the filtering result to brighter values with a positive offset and to darker values with a negative offset (brightness).

Preview works in the same way as described above in **Median** and **Blur** Filters.

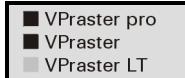
Apply Filter will activate the current filter option on the original.

Close exits from the dialog box. If there are modified or new filters which have not been saved, the user will have the opportunity to cancel the closing action in a dialog box. Otherwise modifications on existing or new filters will be lost.



Filter Table

Filter Type	Name	Size			Direction
		3	5	7	
Blur Filters	blur	✓	✓	✓	0
	gaussian	✓			0
	crosshatch	✓	✓	✓	↔
Edge Detection Filters	horizontal	✓			↔
	vertical	✓			↔
	kirsch_e	✓			→
	kirsch_n	✓			↑
	kirsch_ne	✓			↗
	kirsch_nw	✓			↖
	kirsch_s	✓			↓
	kirsch_se	✓			↘
	kirsch_sw	✓			↙
	kirsch_w	✓			←
	l2rdiagonal	✓			↖
	laplace1	✓			↔
	laplace2	✓			↔
	laplace3	✓			↔
Effect Filters	sharpen	✓	✓		↔
	speckle	✓			↔
	sobel_horiz.	✓			→
	sobel_vert.	✓			↑
	north	✓			→
	south	✓			←
	west	✓			↓
	east	✓			↑
	3d			✓	↖
	deeppress		✓		↘
	jigglevert		✓		✗
	woodcut	✓			↗



Palette Transformation

General

A scanned image containing up to 256 colors (or grayscales) will be based on pixels carrying an index that is scaled from 0 to 255. This index represents a specific color by its portions of the three basic colors red, green, and blue (each basic color having a value from 0 to 255) that have been assigned during the scan process to a palette. Hence, a palette is a table where each of the image's colors (max. 256 or less) is assigned proportions of the basic red, green, and blue color (i.e. RGB).

The transformation of such a palette compensates of possible scan weaknesses (e.g. contrast or brightness) or to modify an image's color representation to individual needs. This is of even more importance if a color scanner or the original document is not available.

There are several palette transformation functions to choose from, depending on how the image should look like after it is transformed. However, each transformation function will not change the index structure of the image palette but only the assigned values for the three basic colors. Thus, the original pixel information remains untouched.

Convert To Palette



From the **VP HybridCAD-Color Tools** menu select **Convert To Palette**. This function generates an indexed color image from the actual true color image.

At the command prompt, enter **vprrgb2pal**

Select Image: Select the image to convert.

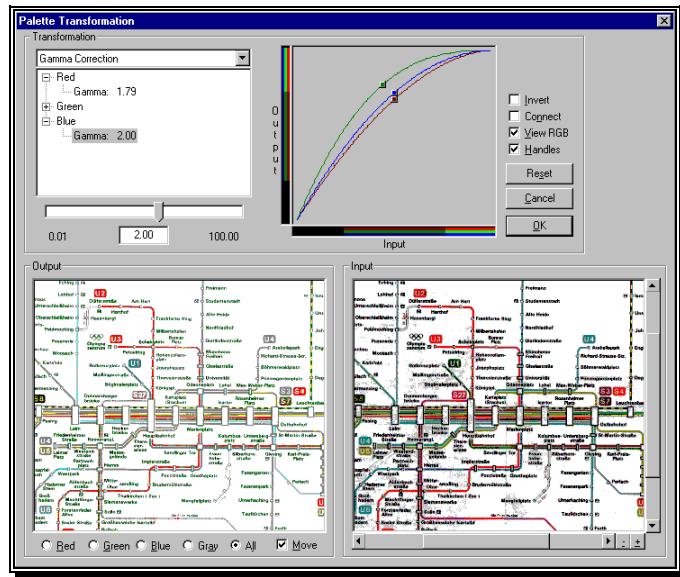
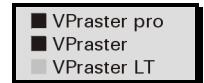
Transformation



If the **Active Image** is an indexed color or gray scale raster file (image) call **Palette Transformation** from the menu **VP HybridCAD-Color Tools** or click this icon.

At the command prompt, enter **vprtrans**

The dialog box for palette transformation appears.



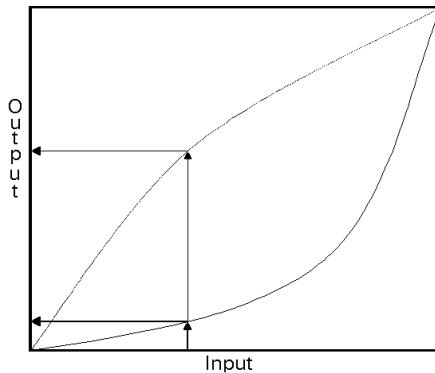
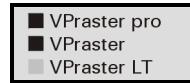
It is organized in three sections:

- Transformation
- Output
- Input

Transformation determines how palette entries will be modified. The **Input** and **Output** both contain views of the actual image ("Output View" and "Input View"). The Input View shows the original image, the Output View the image based on the transformed palette.

On the left of Transformation, the transformation name and a numerical representation ("Numerical View") is displayed; on the right a graphical representation of the transformation is shown ("Transformation View").

The vertical axis in the Transformation View represents the Output values of the current palette (black is on the bottom, white on top). In case you have chosen a colored image the axis is displayed in red, green, and blue. Otherwise, it will appear in gray. The palette's Input values are represented accordingly by a horizontal axis (black is on the left, white on the right). The Output axis' color succession can be reversed using the *Invert* checkmark. The following diagram shows how to read the Transformation View:



With two different transformation used in this example the same value of the Input palette is transformed into two different Output values.

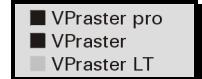
The combo box allows selection of one of the available transformation:

- **Automatic Brightness/Contrast***
- **Brightness/Contrast***
- **Automatic Smooth***
- **Smooth***
- **Gamma Correction**
- **S-Gamma Correction**
- **Steps**
- **Lines**

The transformation marked with (*) bear a default setting when selected depending on the image. "Automatic" transformation do not carry settings that can be modified. Transformations marked with (#) can only be modified in the Numerical View. Selecting a new transformation changes both the Numerical and the Transformation View. To modify the transformation settings you can edit in both views.

When the **Connect** checkmark is **on** and a color image is to be processed, then the three basic colors red, green, and blue will be treated together. Thus, only one curve is displayed in the Transformation View.

Moreover, the combined treatment of the three basic colors with **Connect** will set a primary active color. It is the one that carries handles, even if the **Handles** checkmark is not set. It is also highlighted in the Numerical View, or it is the only color that is represented by a curve (if **Show RGB** is deactivated). With **Connect**, the active color's current attribute values will be assigned to the remaining two basic colors.



If the checkmark **View RGB** is **on** and **Connect** is **off** with a color image, there are three curves, each with a different color. If **Connect** is **on** Windows 95 displays a yellow curve whereas Windows NT shows a RGB curve.

To modify only one color set **Connect** to **off**. Then the active color's curve (red, green, or blue) is displayed. Depending on the **View RGB** checkmark setting the other two colors will either be accessible, too, or they are not displayed.

There are three ways to select a specific color for modification:

1. Select the desired color (**Red**, **Green** or **Blue**) in the Numerical View.
2. Click with the right mouse button in the Transformation View window. A popup menu appears for selecting a color.
3. Set the **Handles** checkmark and click on the desired color's curve handle.

The parameter settings of a transformation can be modified in the Numerical View or in the Transformation View.

In the Numerical View, select the parameter by expanding (i.e. double clicking) the desired color, and click on one of the parameters. You can modify the value either by moving the slider or by entering the desired value in the edit field. The affected handle will be indicated by changing to a brighter color. The Transformation View and the Output View display the new setting accordingly.

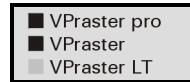
In the Transformation View, dragging any one of the curve handles can modify the transformation. To move the transformation curves with the appropriate handle the cursor symbol changes. The Numerical View and the Output View will display the new setting accordingly.

The **Steps** and **Lines** transformation do not carry curve handles by default. However, you can place optional handles on the curves in the Transformation View by clicking with the left mouse button. To remove a handle click on it with the right mouse button.

Reset sets the actual transformation back to its initial state.

Cancel closes the dialog without modifying the image's palette.

OK closes the dialog, confirming the modifications to the image's palette.



Output

The Output area is organized in two sections: the Output View and a set of buttons to modify the Output View and, thus, the image's palette.

Red, **Green**, and **Blue** display an image in the corresponding colors of the palette. **Gray** generates a gray scale representation of a color image while **All** displays an image in all of the three basic colors.

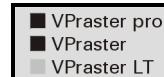
The Output axis of the Transformation View reflects a modification to these settings. Selecting **Red**, **Green**, **Blue**, or **Gray** can also change the Numerical View and the Transformation View.

With **Move** set to **on**, the Output View will be synchronized with the movements of the Input View sliders.

Input

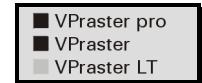
The Input View shows the whole image by default. The view can be modified using the two sliders and the **Zoom In** [+] and **Zoom Out** [-] buttons. The maximum Zoom In displays a 1:1 view of the image.

The Output View changes according to the modifications of the Input View.



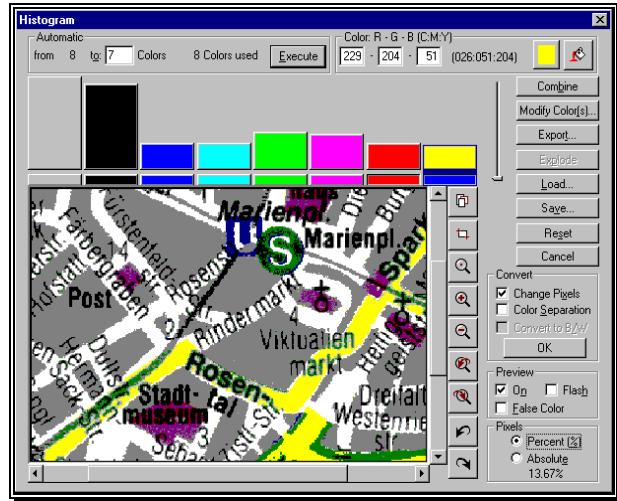
Palette Transformation Table

Transformation	Effect	Value, Handle
Automatic Brightness/ Contrast	The palette is stretched to fit the whole dynamic range without loss of information.	-
Brightness/Contrast	The brightness and contrast of the image can be adjusted.	Brightness(X), Brightness(Y), Contrast,
Automatic Smooth	The palette is modified so that in the Output every palette entry has the same frequency.	-
Smooth	The palette is modified so that in the Output each palette entry has the same frequency. The scale factor modifies the transformation.	Scalefactor,-
Gamma Correction	Black and white remain unchanged while the intermediate palette values are modified: Gamma < 1: stretching of lighter values, compression of darker values. Gamma > 1: stretching of darker values compression of lighter values.	Gamma,
S-Gamma Correction	Black, white, and the Turnpoint remain unchanged while intermediate palette values will be modified. Gamma < 1: stretching of lighter and darker values, compression of values within the Turnpoint range Gamma > 1: compression of lighter and darker values; stretching of values within the Turnpoint range.	Gamma, Turnpoint,
Steps	A range of Input values is transformed to one Output value.	Handle X, Handle Y,
Lines	Multiple effects depending on individual value settings (handles).	Handle X, Handle Y,

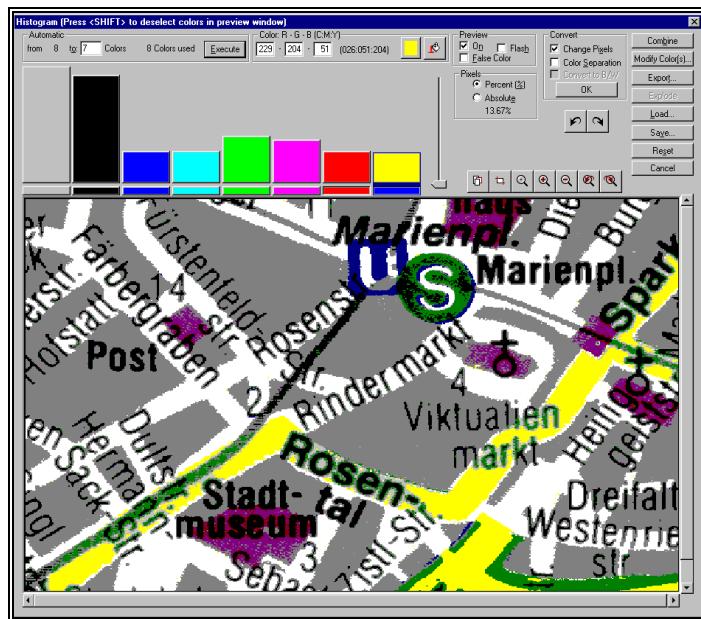


Histogram Dialog Box Displays

Dialog box with 800*600 pixels resolution:

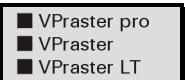


Dialog box with 1280*1024 pixels resolution:



Section 8

This section applies to:



Operation: Rubber Sheeting, Split, Merge, Cut to Paper Format

Multi Point Rubber Sheeting

To complete the rubber sheeting of raster files efficiently, especially in cartographic and cadastral applications, the following parameter settings and functions should be considered:

1. Step: Adjustment of the coordinate system according to the specific map.
2. Step: Rubber sheeting set-up.
3. Step: Entering of reference points including correction values, if necessary.
4. Step: Completion of rubber sheeting with previous selection of the required transformation function.

The user will be guided through all necessary steps automatically.



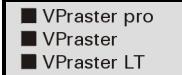
Choose the **VP HybridCAD** function **General (Multi Point)** to perform multi point rubber sheeting on the **Active Image**.

At the Command prompt, enter **vprrubber**

Rubber Sheeting Functions

You can choose from **six transformation functions** supporting different rubber sheeting requirements. With each function, a minimum number of coordinate values (reference points) is indicated for successful completion.

Function	Min. no. of ref. points	Original state	Result
Helmert	2	Rotated square	Orthogonal or Aligned Square
Affine	3	Arbitrary parallelogram	
Linear	4	Arbitrary rectangle	
Quadratic	6	Arbitrary quadrangle incl. local distortion	
Cubic	10	Arbitrary quadrangle incl. increased local distortion	
Exact	3	Any distortion	



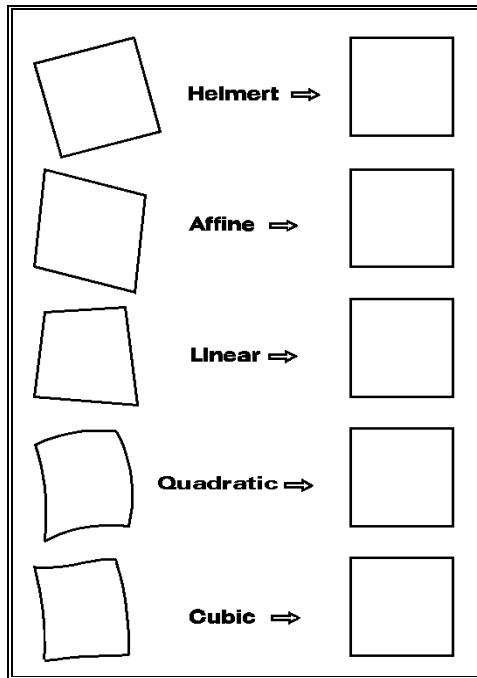
Reference points should be evenly spread out on the map. If this is not the case, local distortions can have an effect on the entire raster file.

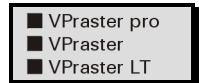
Higher functions (quadratic and cubic) should be performed with about twice the minimum number of points. When using a grid a minimum of 16 points (quadratic) or 25 points (cubic) should be entered. Also, there should be an even number in each of the x and y directions.

The **Exact** function can be used to correct any (nonlinear) distortion in a map or drawing. It is especially useful if you need to correct particular points to exact positions. However, high deviations of the displacement direction within an area may lead to bent or cornered lines.

A warning message will appear in cases where the mathematical equation cannot be solved properly. Entering additional reference points or, when these do not exist, choosing a lower transformation function can solve the problem.

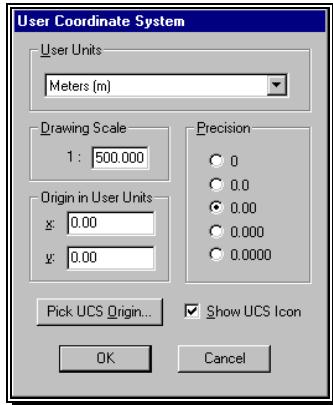
Imagine a **square** with different grades of distortion. Rubber sheeting functions can correct the following distortions:





Set Up User Coordinate System

When selecting **VP HybridCAD - Rubber Sheeting - General (Multi Point)** a dialog box appears to set up the User Coordinate System. The **Active Image** will be moved and scaled to fit these coordinate settings for the rubber sheeting:



User Units

All standard units from **pixels** to **miles** are available for selection.

Default: **Millimeter [mm]**

Drawing Scale

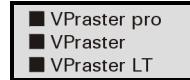
Select the scale of your drawing or any other scale if you wish to convert your drawing scale.

Default: **1:1**

Precision

With reference to the selected **User Units** you can specify the number of decimal places. Internally each value will be mathematically rounded to the last digit.

Default: **0.00**



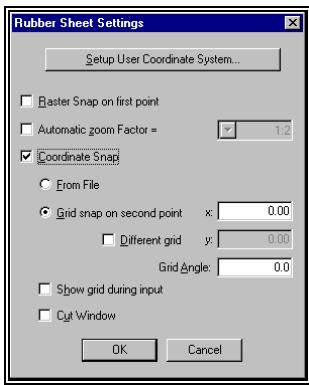
Origin in User Units

Enter the origin of the coordinate system in **User Units**. By default the lower left corner of the image will have the entered coordinates. To specify a different point on the drawing press **Pick UCS Origin** to pick a position on the image.

Default: $x = y = 0$

Rubber Sheet Settings

After setting up the User Coordinate System a dialog box appears to enter rubber sheet settings.



Raster Snap on first point [on/off]

If suitable, the raster snap option can be used for easy positioning of the reference point's **actual position**.



It is not recommended to use this setting unless this image grid consists of thin lines or reference crosses.

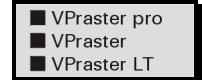
Default: off

Automatic Zoom Factor [on/off]

When switched **on**, the area at the selected reference point will be zoomed in according to the selected zoom factor prior to positioning the reference point.

Default: off

Default value: 1:2



Coordinate Snap [on/off]

If the reference points are evenly spread throughout the drawing on the connection points of a virtual grid or the coordinates are saved in a text file **VP HybridCAD** can assist you with the input of the actual coordinates by panning automatically to the target coordinates. The user may only click sequentially the marked reference points in the drawing.

Default: off

From File allows to enter a file name and file settings in the subsequently displayed dialogs containing coordinate target values (see below).

Choosing **Grid Snap on second point** you can setup grid properties for the target positions. Enter the grid point distance for the X coordinate. If the grid has a different spacing in the x and y direction switch on **Different grid** and enter the corresponding spacing into the X and Y fields. In case of a rotated image enter the angle in the field **Grid Angle**.

Default Grid Snap on second point: on

Default X: 0

Default Grid Angle: 0°



Images with rotated grids will be deskewed according to the grid after rubber sheeting. If the image should remain rotated, set the value of the registry key **HKEY-CURRENT-USER\software\softelec\VPxxx\VP\RubberSheet\KeepGridAngle** to "1".

Administrative rights are required.

If **Show Grid during input** is activated the grid will be displayed permanently during the rubber sheeting procedure.

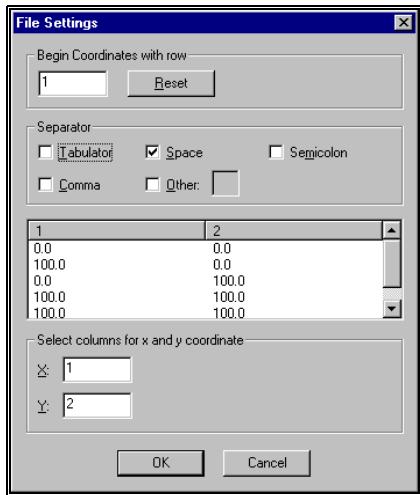
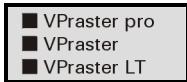
Default: off

Cut Window allows for drawing a window, which limits the area of input of the reference points. Only grid positions **inside** this window will be offered.

Default: off

From File

For target reference points stored in a text file you can use this function to read the target coordinates. Clicking **OK** in the dialog **Rubber Sheet Settings** allows you specify the text file in a subsequent dialog if the this option is enabled.



After confirmation of the settings with [OK] a dialog displays the number of the actual input points required.



Lines in the text file containing coordinate values must begin with a number at the first position. Otherwise the line is suppressed.

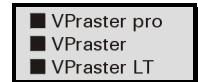
Begin Coordinates with row

Coordinate files that have been generated by other applications may contain additional text information. If it is located at the beginning of the file you can skip it by entering the line number where to start the import of coordinate values. You can get the line number from the displayed list. Then all preceding data is removed from the list and the row number is set to 1.

Default: 1

Separator

Select the characters that are used in the text file to separate consecutive coordinate value from each other. In the displayed list you may check the correct settings. X and Y coordinates must be displayed in individual columns.



Select columns

Enter the columns of the **X** and **Y** coordinates which you can read from the head line of the displayed list.

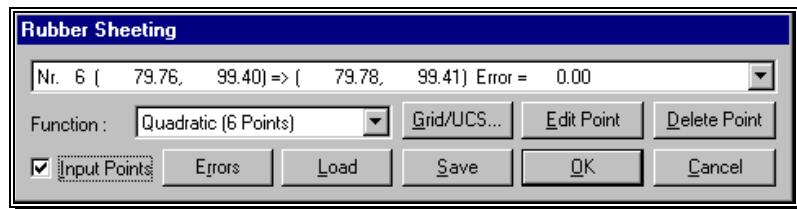
Default X: 1

Default Y: 2

Input of Reference Points

After completing the rubber sheeting set-up, a dialog box appears prompting the entry of **reference points** and choice of a **rubber sheeting function**. If **Grid Snap on second point** has been switched on a grid appears displaying the reference net that need to be specified. Use **Grid/UCS** to properly adjust the grid's fitting. The grid will be displayed until the **Input Points** checkbox is activated.

Input Points [on/off]



The input of reference points can be switched on or off. The checkbox is switched off by default. When switched on, the program is ready for input of reference points.

When **Automatic Zoom** and **Grid Snap** are selected the **origin** (as set in the **user coordinate system**) will be zoomed in to position the first **actual point**. The program jumps to the origin. If the origin has not been set on, the first reference point, the program zooms in to the lower left corner of the raster file (default origin). You must search for the first point.

With a click on the **actual point**, the **target point** will then be set automatically to the next grid point. In the dialog box, both the **actual** and **target coordinates** are listed. The cursor will jump to the next reference point according to the preset grid spacing and continues likewise until finished.



As soon as the minimum number of reference points is entered (according to the selected rubber sheeting function), the remaining offset from the target position for each reference point **after** the rubber sheeting process will be calculated and displayed. According to the number of entered reference points, the system will automatically select a higher transformation function and will calculate accordingly.

If the **Grid Snap** jumps to an area with a missing or unclear reference point (sometimes you may even look at an "empty" screen), you should first zoom out using the (-) zoom icon, or if you are out of the drawing extents, then skip this point by using the right mouse button.

At each reference position **cross signs** and **vectors** indicate:

- **Number of the reference point**
- **Blue cross** = **actual value**
- **Green cross** = **target value**
- **Yellow cross** = **attainable correction according to selected rubber sheeting function**
- **Distance green/yellow** = **remaining offset from the target value**

After all reference points have been entered according to the grid spacing, **Input Points** is switched **[off]**.



If the **Grid Snap** has not been activated - only the **Automatic Zoom** - then the cursor appears as a **frame box** to zoom in to any desired position for clicking a reference point (**actual position**). Then an **input box** appears containing the coordinates for the reference point as actual (= **Adjust from:**) and target (= **To:**) position. The target value may be entered (modified) by keyboard.

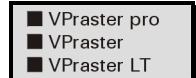
You may decide to either enter **cartesian (X and Y)** or **polar** coordinates (**distance** and **angle**). At least one cartesian coordinate value must be entered before you can input polar coordinates.

After **OK** the frame box cursor re-appears while the screen switches to extent view.

If neither **Grid Snap** nor **Automatic Zoom** are activated the **input box** appears with each click on the raster drawing. In this case the user will have to zoom in unassisted.

Clicking on **Input** will end enter mode of reference points.

Default: off



Rubber Sheeting Function

Select the rubber sheeting function. There are six different functions to choose from. While in input mode the program suggests a suitable function automatically and will calculate correction values concurrently. In proportion to the number of entered reference points the system will suggest a higher transformation function, i.e. providing the highest attainable rubber sheeting precision. A lower transformation function can always be chosen.



If the mathematical equation cannot be solved properly, a warning message will appear. In this case more reference points ought to be entered or a lower function should be selected.

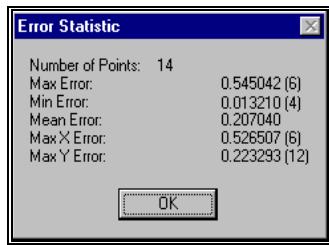
Button-Functions

Save allows saving of reference values and settings to a file (extension **.RYP**) preferably in the raster file's directory.

You also can export a text file (extension **.TXT**) containing all information of the current rubber sheeting setup for documentation (e.g. reference point coordinates).

Load will load a **.RYP** file to continue with rubber sheeting operation.

Error Statistics opens an info box showing error statistics:



Delete Point deletes the current reference point.

Edit Point opens another dialog box to edit a reference point.

Grid/UCS returns to the rubber sheeting settings..

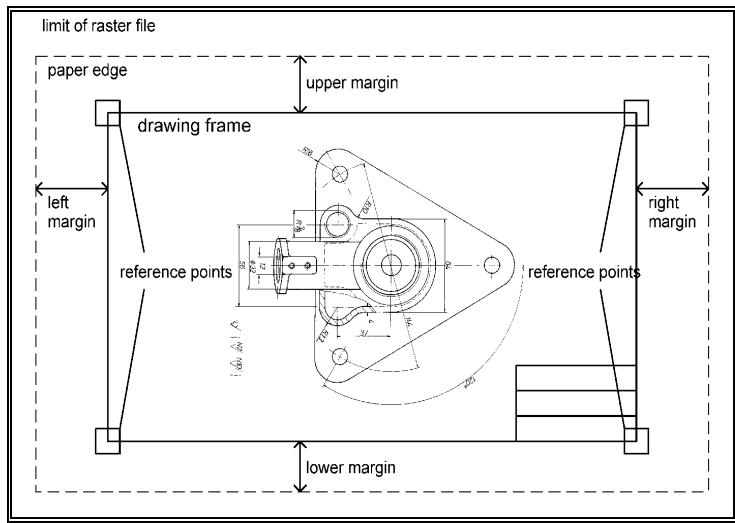
Cancel will terminate rubber sheeting operations at any time.

OK starts the rubber sheeting. After completion the **corrected file** will be displayed containing **yellow** and **green** cross signs to review the accuracy of rubber sheeting. Termination with **OK**. The new file should be saved.

Rubber Sheeting of Technical Drawings/ Cut to Paper Format

Quick Calibration

This function operates on the **Active Image** and is especially designed for rubber sheeting of technical drawings based on the drawing's paper format. Usually, technical drawings are created on transparent paper material with a drawing frame bearing an orientation to the paper format. This drawing frame will be used as a scale reference for the necessary rubber sheeting process. It is also assumed that the drawing's contents will remain in the desired scale after the completed rubber sheeting.

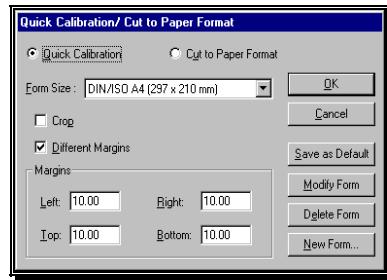
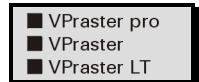


Preparation

Initially, the drawing should be rotated so that the desired paper edge appears at the screen's top (**VP HybridCAD - Raster File Edit- Rotate**).

After selecting **VP HybridCAD - Rubber Sheetng - Drawing Format (4 Point)**, the format selection box appears to define drawing formats and margin widths.

At the command prompt, enter **vprformat**



Form Size

The list having the majority of standard forms will be used for processing the closest match to the dimensions of the raster file (outer frame).

The button **New Form** opens a dialog box to enter the data of a user specific form. Values refer to **Drawing Units** settings (pixels, mm, or inches).

The button **Modify Form** opens a dialog box to modify the specifications of the selected form.

Delete Form will delete the selected form.

Crop

This function erases all raster information within the specified margins (e.g. between the two rectangles).

Default: off

Margins

Enter margin values for:

Left, Right, Top, Bottom

The 4 margins determine the distances between the **drawing frame** and the physical **paper edge** (= drawing format). For example, the length of the paper form (taken from edge to edge of the paper) minus both margins (**left** and **right**) will define the effective drawing frame's length **after** the rubber sheeting process..

While each paper format can bear different values for margin distances, **Save as Default** saves the actual margins for permanent use with the selected form size.

Different Margins [on/off]

When **on**, different margin values can be defined. When **off**, the **Left** margin value will be set for all margins.

After selection of **Form Size** and **Margins** and clicking **OK** the paper format rectangle will be placed on your drawing. If there are margins specified a double rectangle will be displayed instead. The upper left corner of the drawing frame will be zoomed in while the cursor appears as a **triple frame box**. Click the corner of the drawing frame box again to zoom in further and then position the end of the rubber sheeting reference line precisely on the raster corner (final click). Then proceed accordingly for upper right, lower left, and lower right.

After entering the 4th corner position, the program zooms back to the extents. **All four reference positions** are marked by green crosses. **OK** will start rubber sheeting. Save the new file.

Cut to Paper Format

This function allows you to cut the **Active Image** as a definable format (size).

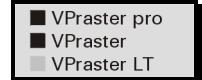
At the Command prompt, enter **vprcutformat**



The drawing should first be deskewed and rotated to the desired orientation before starting this procedure.

On selection of the menu **VP HybridCAD – Cut to Paper Format** the format selection box (see **Rubber Sheetng of Technical Drawings**) appears to select a fitting drawing format or to define new format settings.

After selecting the **Form Size** and the **Margins** click **OK**. The cursor will then be replaced by a rectangle (or a double rectangle if margins have been specified) representing the new image boundaries. Place the (inner) rectangle at the desired position with a left mouse click. To rotate the rectangle by 90° press **[Shift]** while positioning the rectangle. A new raster image will be generated according to the outer rectangle boundaries.



Split a File

At the command prompt, enter **vprsplit**

You can split the **Active Image** into a maximum of 25 sections by positioning up to four horizontal and four vertical split lines on the drawing. Each section is then saved into a separate raster file.

This function is especially useful to split large raster files which cannot be processed in their original size. The maximum size of the raster file to be split is:

Horizontal: 64,000 pixels
Vertical: Unlimited

When executing this command, a box appears with operational instructions. Then the raster file to be split must be selected and loaded. A dialog box appears to define the number of horizontal and the number of vertical sections:



If more than the maximum of 5 sections (for each direction) are selected, an error message appears.

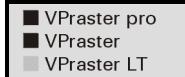
The **status line** calls for positioning of the **first horizontal split line**. Follow these steps for positioning all horizontal and then vertical split lines:

- Click where the first line should be positioned.
- The split line appears in **green**.
- Clicking with the **right** button (cancel) deletes the last split line and you can reposition it.
- Continue until all horizontal and vertical lines have been selected. Click **once again** after positioning the last line for total confirmation.
- Then you are requested to enter the **base file name** for all split files containing **six characters max**. Two digits will be appended as 00, 01, etc.

During the consecutive saving of all files, the system adds two digits to the base name from 0 to 4 (max.), defining the position of the split file in correspondence with the original file:

First digit: Horizontal position
Second digit: Vertical position

The origin (00) resides at the upper left. After all files have been saved, they will be deleted from memory.



Merge two Files



Two raster files - even having different raster data formats - can be merged into one file.

At the command prompt, enter **vprmerge**

In order to allow subsequent editing and processing the maximum size of the merged file can not exceed the following values:

Total width: max. 64,000 pixels

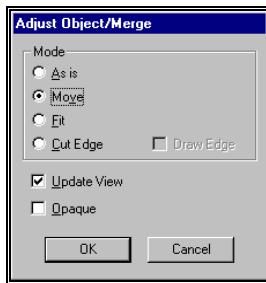
Total length: max. 64,000 pixels

Total area: 4 billion pixels



The process always merges the **Active Image** with **one** raster object. The system requests to select one raster file and loads it.

A dialog box appears to select the appropriate merging method:



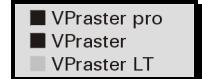
As is merges the two files as they are displayed on screen.

Move allows the raster object to be moved with respect to the first loaded raster file without scaling and/or rotation according to **one moving vector**. Then both files are merged.

Fit calls for **two moving vectors**, whereby the raster object can be scaled, moved, and/or rotated according to the two vectors with respect to the first loaded file. Then both files are merged.

Cut Edge, similar to **Fit**, uses two moving vectors for fitting the second loaded file to the initial one. The function cuts both images along a line through the target points of the two vectors.

Draw Edge [on/off] allows for drawing a user defined line for cutting both images instead of the line through the target points.



Update View updates the display after entering each of the moving vectors (only with B/W images). If one or both files are colored, the display will only be updated prior to the final confirmation.

The **Opaque** option is only functional on B/W images. It allows for non-transparent overlaying of two files.



If the two files to be merged must fit very precisely to each other, then both files should be rubber sheeted prior to the merging process.

After file selection (the first being the **Active Image**, the second loaded as a raster object), the moving vector(s) - one or two depending on the merge mode - have to be drawn. The cursor appears with a **frame box** to be positioned in the region of the starting point of the first moving vector on the raster object. When clicking that point the area will be enlarged and the normal cursor appears, allowing for a precise pick of the starting point with the next mouse click. Once this is done, the program zooms back to the extents; the cursor has a frame box again to which the free end of the moving vector is attached.

The end point of the moving vector has to be defined in the same way on the first loaded raster file and then the 2nd vector if necessary (Fit mode). After each vector has been drawn the graphic representation is updated accordingly (moved, rotated, or scaled).

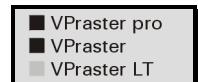
The right mouse button (cancel) deletes one set point with each click to allow redefinition into another or more precise position (e.g. with four right button clicks all set points of the two vectors are reset).

Click once again with the left button for final confirmation and to start the merging process. The new file is displayed and should be saved.

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Section 9

This section applies to:



Operation: Interactive Tracing

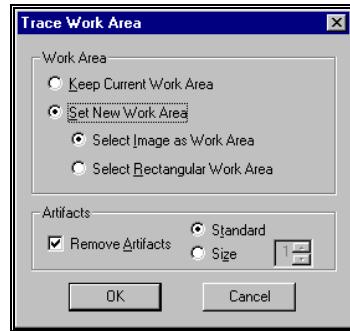
General Information

The trace function allows for interactive raster-to-vector conversion.

All trace functions work on the currently **Active Image**.

The raster file is loaded and should be cleaned up or corrected before proceeding. Depending on the type of original, the **CAD Trace** function can be used to generate CAD elements such as lines, circles or arcs. The **Contour Trace** function can only create polylines and splines. The **Contour Trace Linetype** function, when selected generates dashed polylines and splines.

Calling one of these functions opens a dialog to specify the work area for tracing.



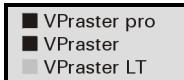
You can select either **Keep Current Work Area** (if a working area has already been selected) or **Set New Work Area** (if no working area is specified or a new area should be defined).

Select Image as Work Area: The entire image becomes the new work area.

Select Rectangular Work Area: The size of the new work area has to be specified by drawing a rectangle on-screen.

The selected work area is prepared for tracing and marked with a colored rectangle.

Remove Artifacts: When activated, short line segments ("artifacts") which would lead to a branch stop are removed upon preparation of the work area. This function can take some time to run on large files. Apart from the **Standard** setting you can also specify a maximum **Size** of artifacts to be removed. This value is a fictitious value in the range [1 to 9].



Pick Trace can be used to trace along connected areas (in B/W images) or along areas of minor color variations (in color images). **Pick Trace** does not need a valid work area to be specified.



To automatically erase raster elements following the tracing routine, click the **Delete Raster Background** icon before tracing. During tracing, the raster elements are covered with the screen's background color.

Trace Settings



To edit trace settings click this button or choose the command **Trace Options** from the **VP HybridCAD-Tracing** pull-down menu bar.

The dialog box opens to define trace settings.

At the command prompt, enter **vprstrace**

Contour Trace Tab



Straightening

By setting the tolerance to **Straightening = Strong**, you can reduce the number of vertices. This is particularly useful if you want to reduce the amount of data or the processing time required for long splines.

Default: Weak



Tools

Show Zoom Window [on/off]

During tracing, a zoom window appears at branch points to provide an enlarged view for selecting the continuing direction of the trace.

Default: on

Assign Elevation [on/off]

After tracing a polyline or a spline you are prompted for an elevation. This option can be useful to create 3D models of a contour map.

Default: off

Append Mode [on/off]

After tracing a polyline or spline a dashed line between the cursor and the end of the trace entity appears indicating that the next element to be traced will be appended. For example, if you have broken raster lines this option allows to easily combine trace elements. Clicking the right mouse button will interrupt the **Append Mode** to start a new line.

If **Zoom to Line End** is on, the system automatically zooms in to the end of the last traced line. This will help to find the next line to continue with.

Default: off

Trace Only One Direction [on/off]

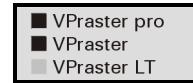
If **Trace Only One Direction** is on, the selected line will only be traced in one selected direction. After clicking the raster line for tracing two direction arrows will be displayed for selection of the trace direction. Then, tracing starts.

Default: off

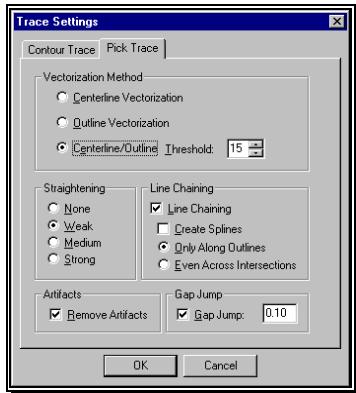
Produce Splines [on/off]

Generate splines instead of polylines.

Default: off



Pick Trace Tab



Vectorization Method

Select **Centerline Vectorization** for tracing along the center of line structures or **Outline Vectorization** for tracing the outline of filled areas or other two dimensional structures. The **Centerline/Outline** mode is a combination of both vectorization methods. The specified **Threshold** is used to toggle between the two methods according to the width of the raster structures.

Default: Centerline/Outline

Threshold: 15

Straightening

By setting the tolerance to **Straightening = Strong**, you can reduce the number of vertices. This is particularly useful if you want to reduce the amount of data or the processing time required for long splines.

Default: Weak

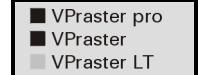
Artifacts

When **Remove Artifacts** is activated, short line segments or line spurs ("artifacts") which would lead to unwanted trace results are removed while tracing.

Default: on



This function can take some time to run on large files.



Line Chaining [on/off]

If ***Line Chaining*** is **on**, polylines or splines (check on **Create Splines**) are generated instead of single lines.

Default Line Chaining: **on**
Default Create Splines: **off**

With ***Only Along Outlines*** switched **on**, polylines (splines) are generated only between intersection. With ***Even Across Intersection*** the polylines (splines) continue at intersections into the direction of the least change of angle.

Default: ***Only Along Outlines***

Gap Jump [on/off]

Small interruptions in the raster data, due to faded and old originals, will be automatically joined together with lines, circles, and arcs up to a reasonable distance. A high value setting may result in false line or arc joins.



If the value is set too high, neighboring vectors can be connected!.

Default: **on**
Default value: **0.1[mm]**



CAD Trace



To activate this function click this button or choose the command **Contour Trace** from the **VP HybridCAD-Tracing** pull-down menu bar.

Using this option, **line**, **circle** and **arc** CAD elements are recognized and assigned to the current layer.

At the command prompt, enter **vprcadtrace**



After clicking on the **CAD Trace** icon, the **Needle and Thread** cursor appears, which is used for picking on raster data for conversion. Pressing the **[Shift]** key (which adds a "+" sign to the cursor) while clicking causes the last traced CAD element to be continued preserving the element type (line, arc, circle) of the element initially traced. Arcs covering an angle of close to 360° are an exception; these are converted to circles.

Contour Trace



To activate this function click this button or choose the command **Contour Trace** from the **VP HybridCAD-Tracing** pull-down menu bar.



This function converts raster elements to **polylines** or **splines** in the currently active layer. Use the **4-Way** cursor to click on the line you wish to convert. The trace module runs in one direction from this point, until it reaches the next branch or the end of the line. Upon reaching the end of the line, or if the process is canceled by clicking the right mouse button at a branch, the opposite direction is automatically.

At the command prompt, enter **vptrace**

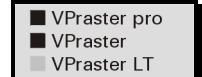
The tracer stops at branches and **arrows** appear for selecting the next tracing direction. In the main window or in the zoom window, click on the arrow for the desired direction. When pressing **[Enter]** the line will follow the most obvious direction (yellow arrow). Clicking the right mouse button cancels the trace at the current branch.



The "**OK?**" cursor appears when a line has been completely traced. Click the left mouse button to confirm the trace and generate the CAD element. Click the right mouse button to discard the result.

To continue a line with gaps, press the **[Shift]** key while clicking on the next part of the line. In this case, the **4-Way** cursor appears with a "+" sign.

If you are in the **Append Mode**, a dashed line appears between the cursor and the end of the traced line and the next part will be automatically appended without pressing the **[Shift]** key. Clicking the right mouse button will interrupt the **Append Mode** to start a new line.



In order to add new vertices to a traced contour at the current position press the **[Ctrl]** key. A "pin" cursor appears and a dashed line is drawn from the current cursor position to the end of the traced contour. Upon clicking the left mouse button a new vertex will be generated at the "pin" cursors position. From here the tracing may continue.

Contour Trace Linetype



To activate this function click this button or choose the command **Dashed Contour Trace** from the **VP HybridCAD-Tracing** pull-down menu bar.

This function converts dashed raster structures into a **dashed polyline** (or **spline**) in the current layer.

At the command prompt, enter **vprdtrace**

On the first line click, the current line segment length is converted. The second click on the next line segment then determines the gap length and continues tracing automatically.

The tracer stops at branches and **arrows** appear for selecting the continued tracing direction. In the main window or in the zoom window, click on the arrow for the desired direction. When pressing **[Enter]** the line will follow the most obvious direction (yellow arrow). Clicking the right mouse button cancels the trace at the current branch.



This function might continue tracing on neighboring lines in tight spots.



This function is only available for B/W raster entities.

Undo Trace



To activate this function click this button or choose the command **Undo Trace** from the **VP HybridCAD-Tracing** pull-down menu bar.

This function is only applicable to the **Contour Trace** and **Contour Trace Line Type**. If you select the "wrong" direction at a branch, this function allows you to undo the last trace segment performed (e.g. up to the previous branch).

At the command prompt, enter **vprbtrace**

The **Undo Trace** icon appears grayed out when the function is not available.

■	VPraster pro
■	VPraster
■	VPraster LT



If you wish to undo the tracing of an entire line, use the **Edit - Undo** [**Ctrl+Z**] command or click on this icon.

Pick Trace



To activate this function click this button or choose the command **Pick Trace** from the **VP HybridCAD-Tracing** pull-down menu bar.

Pick Trace can be used to trace along connected areas (in B/W images) or along areas of minor color variations (in color images). This area is traced along its outlines or centerlines producing lines and polylines or splines in the current layer.

At the command prompt, enter **vprptrace**

This function does not need a valid work area.



In colored images the considered area and, thus, the tracing result are highly dependent on the click point.

Stop Tracing



To activate this function click this button or choose the command **Stop Tracing** from the **VP HybridCAD-Tracing** pull-down menu bar.

This function ends the current trace mode.

At the command prompt, enter **vpretrace**

Section 10

This section applies to:

	VPraster pro
	VPraster
	VPraster LT

Operation: Raster-to-Vector Conversion (Vectorization)

General Information



If a raster image has been currently loaded this icon switches to the vectorization mode. The standard AutoCAD window is temporarily disabled and special **VP HybridCAD** functions are available for the **Active Image**.

When calling **Vectorize** again for an already vectorized raster image, the previously generated vector entities will be displayed for editing.



Only the **Active Image** (raster image) is accessible in the vectorization mode. No AutoCAD vector entities can be processed therein.



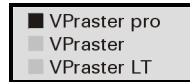
Only bi-level (monochrome) raster data can be vectorized. With color raster data you must first process color separation.

The vectorization process consists of two steps:

1. Raw vectors are created from the raster data (the entire file or only parts thereof) using **Vectorize**.
2. CAD elements, text, hatch, dimension arrows, and similar items are recognized during the second step, **Post Processing**, according to the parameters in the Post Processing Parameters Set.

In order to obtain optimal results, the file or section to be vectorized should be prepared (e.g. cleaned and corrected) as well as possible using the raster file editing tools.

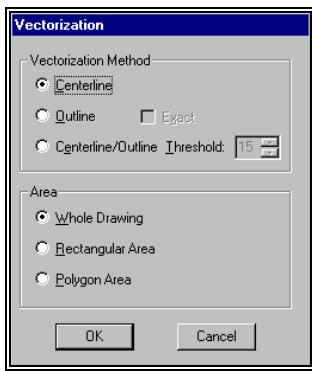
After leaving the vectorization mode the raster and all newly created vector entities are added to the AutoCAD database and displayed.



Vectorizing (Generation of Raw Vectors)



Clicking on the icon or invoking the function brings up the following dialog box:



Choose the vectorization method and vectorization area.

Vectorization Method

Three vectorization methods are available:

- ***Centerline Vectorization***
- ***Outline Vectorization***
- ***Centerline/Outline Vectorization***

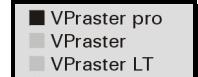
Centerline Vectorization

The middle (centerlines) of each raster structure is determined by thinning inward from the edges and displayed as line chains consisting of individual line segments. In the case of raster structures with an area of more than 62 pixels, centerline vectorization switches to outline vectorization for the remaining area, e.g. after thinning inwards 62 pixels; these remaining raster structures are represented by contours using line chains.

Centerline vectorization is the best vectorization method for technical drawings.



In order to avoid objects from "hollowing out" when using centerline, do not scan above 600 dpi. Raster line widths can easily exceed the 62 pixel threshold.



Outline Vectorization

Converts the contours of raster structures to line chains, creating line structures which wrap around all of the raster elements. This vectorization method is best suited for the conversion of originals containing filled areas, text, and logos.

Exact [on/off]

The standard **Outline Vectorization** will straighten vectors across edges to smooth the raster outline. With **Exact** set to **on**, the outlines follow exactly the raster. This can be useful when vectorizing text outlines or in other applications.

Centerline/Outline Vectorization

Toggling between centerline and outline vectorization can be set to occur at any desired value (in pixels) by entering a **threshold value**. One application for this combined vectorization method is the conversion of architectural floor plans, in which the main walls are represented by broad, filled areas. These are converted to vectors with their contours.

Threshold

This parameter can only be set with centerline/outline vectorization. Its **pixel value** determines the point at which filled raster structures are no longer represented by their centerlines, but by their contours instead.



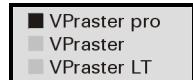
The threshold value must be carefully calculated. It should be a value wider than the widest line (for centerline recognition) yet small enough so as not to centerline objects that should be outlined. Otherwise you run the risk of alternately switching between centerline and outline vectorization along the length of an element, due to its varying widths.

Range: 5 thru 32 [pixels]
Default: 15 pixels

Area

The available options are:

- **Whole Drawing**
- **Rectangular Area**
- **Polygon Area**



The rectangular area option makes it possible, especially in the case of large originals, to "test" (on one or several sections) the correct parameter settings for achieving optimal results, before converting the entire drawing.



These options are not accessible if raster objects have been selected.

Post Processing

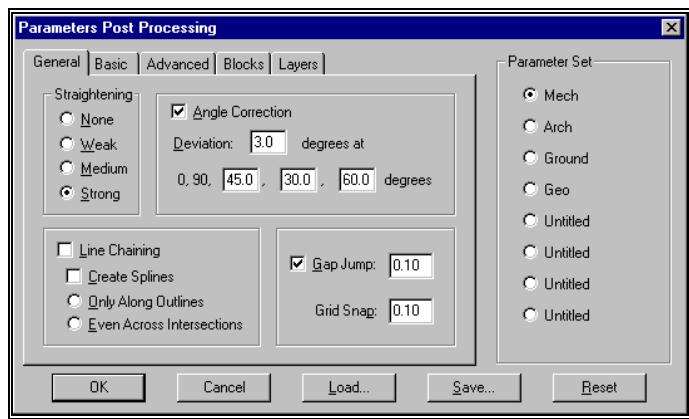


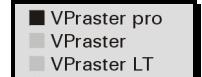
Vector post processing is initiated. All vector data or only the selected vector data are post processed according to the active parameter values. Vector post processing can occur with raw vector data or also - using different parameter values - with previously post processed vectors. Selections are made using **Window, Cross, Pick**.

Parameters Post Processing



Clicking on this icon or choosing **Options - Parameters Post Processing** brings up the following dialog box:





The five tabs

- **General**
- **Basic**
- **Advanced**
- **Blocks**
- **Layers**

are used for setting all parameters which control the post processing of vector data. To obtain best results, the parameter values should be adjusted to the requirements of the drawing on hand.

Using **Save** and **Load**, parameter settings can be saved for later use. By default, settings are saved in the SUPPORT subdirectory with a **.PCF** extension and can be loaded into one of the 8 parameter fields. The selected parameter file overwrites all parameters with those stored in the file. If a parameter value is changed manually, the name of the active parameter file is set in parentheses.

Reset restores all parameter values to their default settings and deletes the parameter file name, replacing it with **Untitled**.

Standard Parameter Files

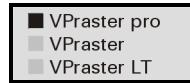
VP HybridCAD software includes four parameter combinations created for originals of the following types:

- **Mechanical** (MECH.PCF)
- **Architecture** (ARCH.PCF)
- **Cadastral maps** (GROUND.PCF)
- **Geological maps** (GEO.PCF)

These four default parameter files are matched for sample images included in this installation and should not be used without modifications as defaults for your own drawings within this classification. However, these parameter files can be easily modified to meet your drawing needs and should be saved with a new name. The files are located in the **SUPPORT** subdirectory and are loaded into the first four positions.

General Tab

These parameters control the amount of line straightening, angle correction, line chaining, gap jump and grid snap.



Straightening

This parameter influences the quality of **line straightening** as well as **circle**, **ellipse**, and **arc extraction**. The following options are available:

- **None**
- **Weak**
- **Medium**
- **Strong**

The **None** setting passes raw vector data on as uncorrected post processed data. While this setting achieves the highest degree of precision in the correspondence of raster structure and vector data, the recognition and extraction of geometric elements is not possible. This setting is recommended for artistic artwork, such as logos.

Strong. This setting forces the extraction of as many long, straight lines (long 2-point lines), circles, and arcs as possible. The tolerance range is expanded to favor a greater degree of extraction particularly for architectural and engineering drawings.

Weak or **Medium**. This setting aims for a compromise between the extraction of lines, circles, and arcs versus congruence with the raster image. This usually leads to the generation of a larger number of fragmented line segments, or for instance arcs instead of a circle, especially when the raster circle does not have an even radius.



A setting of **Weak** or - where the highest degree of centerline precision is required - **None** is useful for geological maps or contour level lines, when the **Line Chaining** parameter is used to generate polylines from raw data.



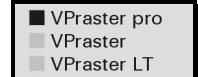
A setting of **Strong** or **Medium** is especially suitable for originals that are predominantly orthogonal oriented and not too dense (mechanical engineering, architecture, etc.).

Line Chaining [on/off]

This setting controls the chaining of individual lines bordering each other into polylines. In the case of geographic contour maps, for example, polylines are produced if **Line Chaining** is activated. The best possible conformity with the original is achieved when **Straightening** is set to **None** (but this creates large vector files because of the large number of vertices!) or **Weak**.

- **Only Along Outlines** limits chaining to areas between intersections.
- **Even Across Intersections** chains lines across intersections. The direction of the smallest angle change at the intersection is chosen for chaining.

Create Splines [on/off] is used to create splines instead of polylines.



Angle Correction [on/off]

Despite the necessity of deskewing the raster file to a reference line using the raster editor, parallel lines are usually not precisely parallel, horizontal, or vertical. The **Angle Correction** function corrects individual lines within the drawing at **0°** and **90°** angles as well as at a maximum of **three additional angles of your choice**.

Deviation determines the maximum deviation from the reference angle that is to be corrected. Since substantial angle deviations can occur in individual line segments in the raw data, the value should usually be **2 - 5°**. If the value is too high, you run the risk of snapping lines that should run within this angle setting without correction.

Default: **3°**

When angle correction is set, **0°** and **90°** are the default angles. There are three other possible **preferred angles** that can be entered or measured using **[F2]**.

Range: **0° thru 90°**

Default: **0°, 0°, 0°**

Gap Jump [on/off]

Small breaks in the raster data, due to faded and old originals, can be joined together in lines, circles, and arcs up to a reasonable distance. A high value setting will result in false lines or arcs.



If the value is set too high, neighboring vectors can be connected! To correct this, simply lower the distance length and post process again.

Default: **0 [mm, inch, pixel]**

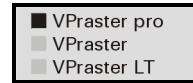
Grid Snap

The length of an orthogonal line, the radius of an arc and the center point and diameter of a circle is rounded to the nearest grid snap value. This is a helpful feature in parametric design issues, but the drawing should first be scaled out to the original size.



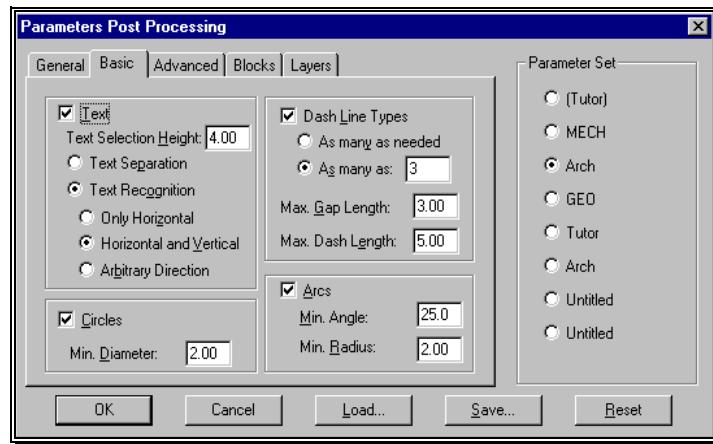
If the value is set too high, distance errors occur that will cause severe vector length or diameter distortions. To correct this, simply lower the rounding number and post process again.

Default: **0.10 [mm] or 0.004 [inch]**



Basic Tab

In this tab you can choose text recognition (OCR), circle and arc extraction, as well as recognition of dashed and dash dotted lines.



Text [on/off]

Choose the maximum **Text Selection Height** for searching text structures when either **Text Separation** or **Text Recognition** is needed. Limiting the search to **Horizontal and Vertical** or **Only Horizontal** text will significantly increase the accuracy of recognition and search speed and should be selected whenever possible. The same applies for **Text Height**.

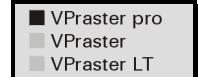
Text Selection Height

Defines the maximum size of the isolated structures to be processed during separation or recognition.

Range: According to drawing unit
Default: 4 [mm] or 0.157 [inch]

Text Separation

The raw vectors separated through **Text Selection Height** are grouped and displayed in the layer "Text" as pseudo text, i.e. empty ASCII strings (showing the "raw" vectors in white color). They can be edited (especially replaced by any ASCII characters) with the **Review Text** function.



Text Recognition

When active all "raw" vectors separated through ***Text Selection Height*** are interpreted using the OCR function and converted into ASCII text strings. (See also ***Options – OCR Options***).

Text Search Direction

The search for different text orientation can be limited. The more directions are enabled, the longer the text interpretation process will take (only available with ***Text Recognition***). Selections are:

- ***Only Horizontal***
- ***Horizontal and Vertical***
- ***Arbitrary Direction***

Arcs [on/off]

In order to avoid unwanted arc interpretations, arc recognition is determined by the ***Min. Angle*** and ***Min. Radius*** parameters.

Minimum Angle

Only arcs including a greater angle than the value entered are recognized as arcs. For technical drawings, the value should be set to at least 25°, since shorter arcs seldom occur. The angle limit does not apply to arcs having a very large radius.

Range: 0° thru 90°
Default: 25°

Minimum Radius

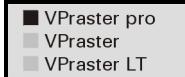
Lower limit for arc extraction. Arcs smaller than the value entered are extracted as line segments.

Default: 2 [mm] or 0.079 [inch]

Circles [on/off]

Min. Diameter sets the lower limit for circle recognition.

Default: 2 [mm] or 0.079 [inch]



Line Types [on/off]

Toggles the recognition of **dash dotted** and **dashed** line types **on** and **off**. An individual line type is usually generated for every line in the original, which is not a solid line. However, the number of line types can be limited by using **As many as**.

At least three partial segments are required to be able to recognize a line type. In the case of arcs and circles, at least five are required.

As many as needed

An individual line type is generated for each line found.

As many as

The found lines are classified. The value for **As many as** determines how many types of dash dotted and dashed lines are created. The value of **Max. Dash Length** is divided by the value of **As many as**. Line types are then created consisting of dash lengths of once, twice ... n times this fraction. The classification occurs by assigning each found line type to the next larger line type. If, however, the line types D1...Dn or DD1...DDn have been predefined in the source drawing, their dash and gap lengths are used.

Default: 3

Max. Gap Length

Defines the maximum gap length in a dashed or dash dotted line to be found.

Default: 0 [mm, inch, pixel]

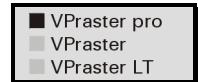
Max. Dash Length

Defines the maximum length of a single dash element in a dashed or dash dotted line to be found.

Default: 0 [mm, inch, pixel]

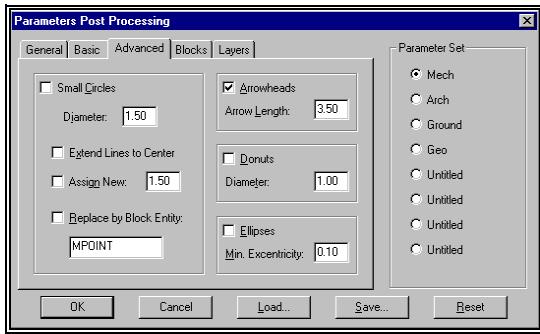


Poor drawings with weak solid lines can generate false dashed lines. It is best to consider that if the drawing to be converted has only a few dashed line segments, to leave this function off. After post processing, you can easily combine the line pieces to one line and then convert it into a dashed or dash dotted line.



Advanced Tab

In this tab, you set the parameters for the recognition of small circles, dimension arrows (arrowheads), donuts, and ellipses.



Small Circles [on/off]

This option is for recognition of small circles up to a diameter of approximately 2 [mm] or 0.08 [inch], corresponding to approximately 25 pixels at 300 dpi with increased tolerance. Arcs spanning an angle larger than 270° are closed to form full circles.

Diameter

Enter the average diameter of circles to be found. This diameter is assigned to all extracted small circles.

Default: 1.5 [mm] or 0.047 [inch]

Extend Lines to Center [on/off]

This option extends lines ending at the circle, but pointing at the circle's center, all the way to the center of a small circle.

Assign New [on/off]

A new diameter can be assigned to recognized circles.

Default: 1.5 [mm] or 0.047 [inch]

Replace by Block Entity [on/off]

Each recognized small circle will be replaced by a block. Instead of the default block: **MPOINT** any block can be used.

<input checked="" type="checkbox"/>	VPraster pro
<input type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Arrowheads [on/off]

Dimension arrow recognition requires filled dimension arrows in the raster data, whose points touch a line (extension line). The length of dimension arrows can be set by the user. The length/width ratio is set to **3**.



The degree of recognition of dimension arrows depends to a great extent on their random design, size, and surface shape in the original. Occasionally, arrowheads are "recognized" at line intersections, even though none are actually present - the lines are merely thicker in some places. The degree of recognition is determined by the **straightening** parameter: the greater this value, the greater the chance that dimension arrows will be recognized.

Default: **3.5 [mm] or 0.138 [inch]**

Donuts [on/off]

This option searches for filled circles at line intersections, e.g. as they occur in electrical and electronic wiring diagrams. As with the recognition of dimension arrows, the degree of recognition depends on the straightening parameter. The user can set the donut diameter, but the vectors (in whole or selected) must be post processed again to reflect the changed diameter.

Default: **1.0 [mm] or 0.039 [inch]**

Ellipses [on/off]

Ellipses with an eccentricity greater than the set value are extracted. Eccentricity is the degree of the ellipse's deviation from a circle; the smaller the value, the greater the likelihood that circles will be recognized as ellipses.

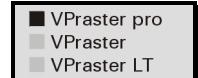


Only horizontal ellipses will be recognized.



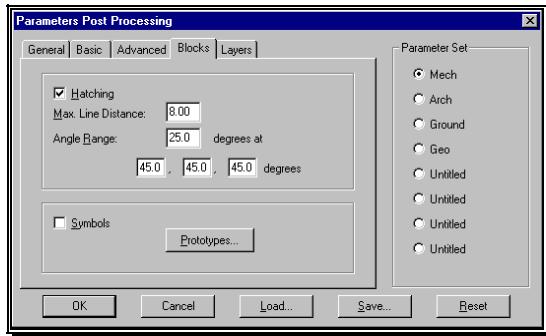
In order to increase the recognition quality for ellipses, circle recognition should be turned off, for example in the case of isometric representations, which tend not to contain circles.

Default: **0.10**



Blocks Tab

This is where you specify extraction parameters for elements to be saved as blocks.



Hatch [on/off]

This option toggles the search for hatch **on** and **off**. The value to set is **Max. Line Distance**. The lines assigned to a hatch pattern are collected and saved in a **Block**. A minimum of five lines are required to create a hatch block. Hatch is recognized if the angular deviation of its lines relative to one of the three base angles is less than \pm **Angle Range** and the angle tolerance of the individual elements is less than or equal to 5° .

Max. Line Distance

Default: 5 [mm] or 0.2 [inch]

Angle Range

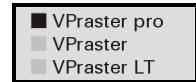
Range: 5 thru 35°

Default: 25°

Base Angle

A maximum of three angles can be entered.

Defaults: $45^\circ, 45^\circ, 45^\circ$



Symbols [on/off]

Use this option to turn **on** and **off** searching for symbols during vector post processing.

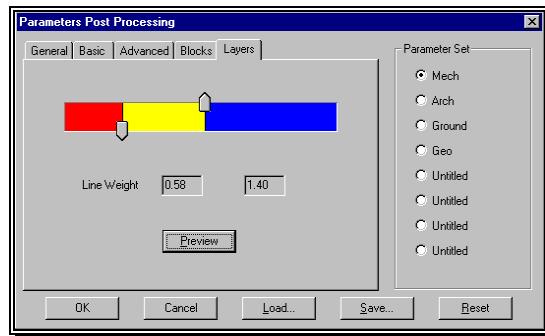
Clicking on **Prototypes** opens the dialog box for the selection of symbol prototypes for the later search process.

If you wish to search for specific symbols in the original, they must be set up as prototypes, activated, and listed in the **Symbols to search** selection box.

For information on creating prototypes, see **Section 12**.

Layers Tab

The **Layers** tab allows you to dynamically assign **three layers** to define **three line width classes**.



The values for the two **class limits** determine the maximum widths up to which lines, circles, arcs, etc. are assigned to the layers **L1**, **L2**, or **L3**. The layer limits can be changed using the slider controls. [It is not possible to enter values via the keyboard.](#)

Preview offers a practical, simple, and precise setting of the limits, if raw vectorization has already occurred and is displayed on-screen. After changing the limits using the sliders, you can immediately view the resulting changes.

For each base layer (**L1**, **L2**, **L3**), **VP** generates additional sub-layers for arcs, circles, and other line types, which belong to one of the three base layers according to their width classification. (See also "Layer Structure" in **Appendix B**.)



Regeneration



This command is used to regenerate the vector data. In contrast to **Redraw**, not only the screen is redrawn based on the internal data, but the structural connections of the vector data are regenerated and displayed as well.

Regeneration is especially helpful for interactive editing of the vectors. If, for example, several line segments are connected to form a single line, or if a non-orthogonal line is deskewed to run orthogonal, overlaps, or gaps may occur at the points where other lines (e.g. hatch lines) attach to this line. **Regeneration** eliminates this effect and creates a clean vector drawing.

Regeneration can be done at any time when vectors are present. Either all vector data or selected ones (pick, window, crossing) will be regenerated. A progress bar appears during regeneration.



After **Regeneration**, it is no longer possible to execute **Undo [Ctrl+Z]** or **Redo [Ctrl+A]**.

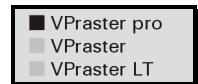
The following post processing parameters also affect regeneration:

- Angle correction
- Gap jump
- Grid snap
- Small circle parameters

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Section 11

This section applies to:



Operation: Hybrid Editor in the VP HybridCAD Window

General Information



In the vectorization mode the **Active Image** and vector entities created by the vectorization process can be edited using **VP HybridCAD's** hybrid editing functions.



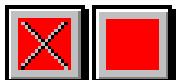
The **Object Creation** function manages all layers, line types and text styles, as well as raster object colors. The settings made in this dialog box apply to all draw/edit functions (see also **Section 4**).

Layer



Drawing always occurs in the chosen current layer. The color and weight of elements displayed are determined by the settings entered for this layer in **Object Creation tab Layer**.

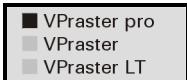
Object Color



Raster objects are drawn in the user specified color. The color indication icon may show one of these designs on top of the color. They indicate one of the following statuses:

- A cross on the icon indicates the color BYLAYER.
- A blank icon showing only a color indicates that this color has been selected from the actual color palette.

After clicking the icon a dialog box appears, showing the current color palette - either the palette loaded with a color file or the **VP default palette**, which contains 16 basic colors and 240 grayscale values. The selected color becomes the current color and is shown on the icon. Also, the selected color will be highlighted in the color dialog.



By default, the color **BYLAYER** is assigned to vector objects. They are displayed in the color specified for their layer. Once the Object Color is changed, this color is assigned to all new drawn vector objects until either another color is specified or a new layer is selected.

If elements are selected the current color will be assigned.

Line Types



The current line type is used for drawing. In addition to **Solid** line types, you can draw **Dashed** or **Dash dotted** line types. Line and gap lengths are set in the *Object Creation* tab **Line Types**.

Orthogonal Drawing

Pressing the **[Shift]** key constrains the drawing direction to $n \times 45^\circ$ of the coordinate system or orthogonal in relation to a reference line. To draw a rectangle at an angle (**Closed Polyline**), press the **[Shift]** key **after** drawing the first polyline segment at the desired angle. Any additional line segments will be drawn at a right angle to the first line segment.

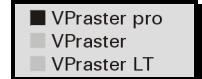
Erase Raster [Ctrl+E] (under vectors)



When redrawing or tracing raster structures, **Erase Raster** can be used to simultaneously erase the raster original in the background. If vector elements are selected when switching on this function, the associated raster background will be erased. Initially, the raster structure is erased by simulation, which appears as imperfect. The erasure becomes complete and permanent after using the **Rasterize** command.



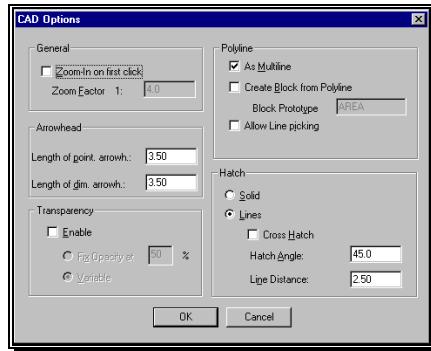
This function is only available for B/W raster files.



CAD Options



A dialog box opens for selection and value input. For details see **Section 4**.



Undo [Ctrl+Z]



Clicking on this icon will undo the previous editing function for a maximum of the last 32 editing steps. This icon is normally grayed out until an edit command is executed, however, after choosing the **Rasterize, Save, Vectorize, Post Process, Regenerate** or **Clear** commands, the undo command is cleared.

Redo [Ctrl+A]



Use this command to repeat the **last** editing command that had been undone. If no editing command has been undone, this function is unavailable and the icon is grayed out.

Redraw [Ctrl+R]



The screen is redrawn or refreshed. In the alternative, you can use **[CTRL+R]**.

General Editing Commands

Explode (Origin)



Reduces the structure hierarchy of the selected elements. **Blocks**, **hatch**, **polylines**, **splines**, and **text** are exploded and separated into their component elements. **Lines**, **arcs**, **circles**, and **ellipses** generated during vectorization are separated into their raw vectors in Layer **P0**. This allows the user to correct misinterpretation resulting from post processing.

Cut



Use this function to cut lines, circles, arcs, ellipses, polylines, and splines. After you activate the command, pick the element to be cut, then use the scissors cursor to cut. Click on the cut point with this cursor; both component parts are automatically deselected.

A line is only cut if it runs **through** the **snap box** of the scissors cursor.

Make Corner



The end points of two selected elements (line, raw lines, arcs) are lengthened or shortened to form a corner. Open polylines are closed.

An error message appears if it is not possible to execute this function.

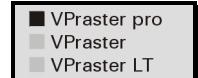
Trim



The selected elements are connected in such a way that all of them end on the element which was selected **first**. This occurs via trimming or extending.

If the element selected first is text, all additional text elements are oriented towards the first one. Other elements (lines, circles, etc.) are ignored.

An error message appears if it is not possible to complete this command.



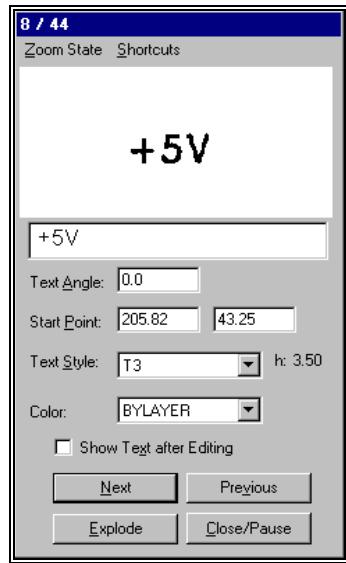
Review Text



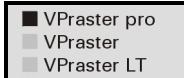
Use this function to verify and, if necessary, edit text extracted during vectorization. The function can be used when parameters **Text Separation** or **Text Recognition** were activated and a value for the appropriate text height was set.

A dialog box appears with the raster text displayed at the top (if a raster file is currently loaded). In addition, the corresponding text in the vectorized drawing is magnified, and the vectors comprising the text are selected. The scaling factor depends on the size of the text. From this value, choose **Zoom State** to increase/decrease this factor.

In this dialog box, you can change all text properties and edit the text directly (using the keyboard). A maximum of twenty-four special characters are directly available via [Alt+1] thru [Alt+9] and [Alt+A] thru [Alt+O] or using **Shortcuts**, if pre-configured. Note that vector elements to be replaced with text can be included by selecting those elements. If you've selected an element by mistake, deselect it by [Shift] and clicking the highlighted element(s). On occasion, you may want to deselect a true line element converted to text: Simply delete the text to restore the original vector(s). This is a form of exploding.



If the check box **Show Text after Editing** is activated, clicking on **Next** will display the current edited text, which can then be **positioned**, **rotated**, and **scaled** as desired before moving to the next text element by clicking **Next** again [Enter].



Use **Next** and **Previous** to sequentially browse and, if necessary, edit all text elements. All changes are automatically accepted. The operation is complete when all text elements have been checked.

Explode separates the selected elements into their raw vectors.

Close/Pause ends the operation. The next time this function is chosen, the process continues at the text element you checked last, which allows you to make other corrections while running the **Review Text** function.

If the function is activated and elements (e.g. text) are selected only these will be processed.

Delete [Del]



Deletes the selected elements. There is no such icon in **VPselect** although the function is available.

Layer Assignment



Selected elements are transferred into the **Current Layer** or into **Layers L1, L2, and L3**. The sub-layers for arcs, circles, and line types are automatically addressed according to the selected elements.

Clicking on **L1, L2, or L3** makes it the **Current Layer**.



Selection and placement of the **Current Layer**.

Line Type Assignment

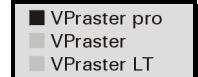


The selected elements are assigned the **Current Line Type**, while the elements are transferred to the corresponding layers, if necessary.

Clicking on one of the three line type icons makes the selected line type the **Current Line Type**.



Every line type that has been set up can be selected and used as the **Current Line Type**.



Text Style Assignment



Selected text is formatted in the **current text style** (first icon) or the newly-selected text style, which then becomes the **current text style**.



If other text styles have been set up in addition to **T1 through T6**, that style can be chosen here as the current text style.

Move Object(s)



If an **individual** vector element is selected, this function is automatically activated. The element is given **handles** so you can **move** (handle with cross), **rotate** and **scale** (empty handles) it.

When **pressing the [Shift] key**, the element's **original** direction is preserved during scaling. During a move operation, the element's direction is constrained to **n x 45°**.

In **Properties [Enter]** relative distances in x- and y-direction may be entered into the coordinate fields using the **[@]** character as prefix to the new value(s).

If multiple objects are selected, the handles disappear upon selection of the second element. After choosing **Move Object(s)** a move handle and handles for rotating and scaling are assigned to the selected elements treated as one object (Raster Objects are displayed only as rectangles in this mode).

Copy Object(s)

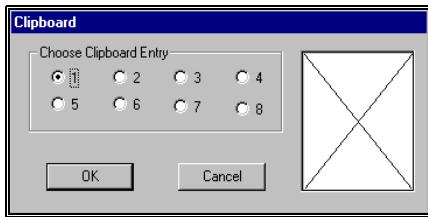
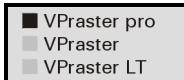


After activation of this function, the selected elements are copied and attached to the mouse for multiple placement. Clicking on the left mouse button completes the copy function.

Copy to Clipboard [Ctrl+C]



Selected vector entities or raster objects will be copied to one of eight available slots of an internal clipboard. When objects have been selected the **Copy to Clipboard** command (**Edit - Copy to Clipboard**) or using **[Ctrl+C]** will bring up the following dialog box:

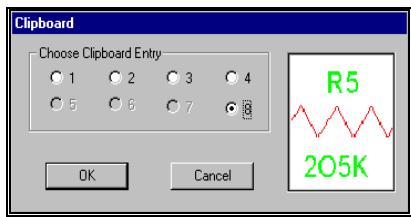


Choose one of the eight slots. The preview window displays an object if the chosen slot already contains data. Otherwise a black cross indicates an empty slot. Click **OK** to copy into this slot. Copying an object to a slot that already contains data will result in overwriting. When no objects have been selected the command appears grayed in the **Edit** menu.

Paste from Clipboard [Ctrl+V]



This command is only available when objects have been previously copied to the clipboard (see above). Otherwise the command appears grayed in the **Edit** menu. The **Paste from Clipboard** command (**Edit – Paste from Clipboard**) or using **[Ctrl+V]** will bring up the following dialog box allowing for a selection of a slot to paste from:

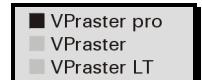


Only those slots containing object data will be available. Click the desired slot followed by **OK**. The slot's contents will be pasted to the screen. If only one slot contains data it is pasted without showing this dialog box. Object handles allow for moving, scaling, and rotating (Raster Objects are displayed only as rectangles in this mode). When clicking the left mouse button the object will be inserted into the drawing.

Last Selection [Ctrl+L]



Re-selects the elements last edited or the elements created in the last editing operation.

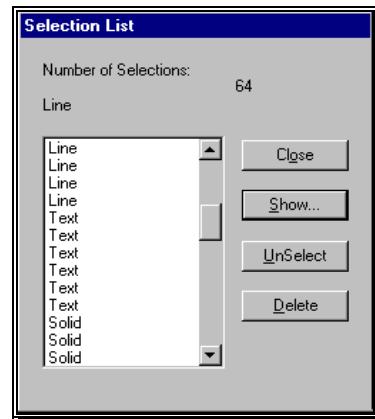


Properties [Enter]

The properties of the selected element are displayed. This function can also be activated by double-clicking on an element.



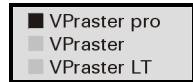
If several elements have been selected, the following overview dialog box appears after entering this command or after double-clicking following the last selection. All selected elements are listed:



After using the mouse to select an element from the list, clicking **Show** will display detailed information about the selected element. This information can be modified using the usual procedures for selection and entry.

Click on **UnSelect** to remove an element from the selection list, i.e. undoing its original selection.

Click on **Delete** to delete a selected element from the list and the vector data. If no element is selected, the first element in the list is deleted.



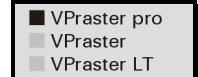
Click on **Close** to close the dialog box and display the remaining elements from the selection list in the drawing with any changes you may have made.

Correct Hatch

For false **Hatch** elements, the **Properties** function allows you to remove elements from the grouping. When the function is activated, all hatch elements turn to the color **white** in the drawing background. Clicking on the element to be removed, it becomes highlighted (inverted) in the list. Use **Remove** to delete the element from the hatch, which then becomes an individual element.

Color can be modified by choosing from the referring list.

To add lines to a hatch, select the lines and the hatch block, and choose **Combine to Block** (block name **HATCH**).



CAD Functions



Drawing always occurs in the **current** layer, in the **current** line type and in the **current** color.

When you choose a vector layer, the current color changes to **BYLAYER**; in the **RASTER** layer it changes to the **Draw Objects** color (selecting the **RASTER** layer using the pen icon) or to the **Erase Objects** color (selecting the **RASTER** layer using the eraser icon). If the color is explicitly changed after selecting the layer, the new color is used.

While drawing an entity all construction lines (**not** the entity) will be shown with a default width of 0.25 mm (0.01 inch). This width is assigned to the **CONSTRUCTION** layer. In **Object Creation** you can modify the width to your individual needs. To save a new width and have this setting permanently available, create the layer **CONSTRUCTION** in an empty drawing, assign the desired line width and save this file under a name of your choice as your new prototype drawing (see also **Settings Tab Files, Section 4**).

Pen



For freehand drawing (left mouse button) or freehand erasing (right mouse button) in the raster layer (B/W or color, depending on the raster file).

Direction of movement is constrained to **n x 45°** by pressing the **[Shift]** key.



Line weight is set using the **Line Weight** dialog box and applies to drawing as well as erasing.

Line



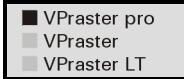
For drawing individual 2-point lines.

Polyline



For drawing a polyline with any number of corner points. Complete the line by double-clicking the left mouse button or press **[Enter]**.
See also **Section 4**.

Close an open polyline by selecting it first and then choosing **Make Corner**.



Closed Polyline



For drawing a closed polyline with any number of corner points (vertices). Complete by double-clicking the left mouse button or pressing [**Enter**].

Hold the [**Shift**] key to draw **orthogonal vertices** to a previous vertex in any orientation.

Hold the [**Ctrl**] key to draw **orthogonal rectangles**. Complete by clicking the second point.

Spline



For drawing a B-spline through the click points. Complete by double-clicking the left mouse button or press [**Enter**]. See also **Section 4**.

Arc (3-point)



For drawing an arc through three points in arc sub-layer "Name"-A.

1st click point	=	start point arc
2nd click point	=	end point arc
3rd click point	=	arc curvature and direction

Arc (4-point)



Draws a counterclockwise arc with a defined radius in arc sub-layer "Name"-A.

1st click point	=	center
2nd click point	=	radius
3rd click point	=	start point arc
4th click point	=	end point arc

Arc (with connection)



For drawing an arc with a tangential connection at two selected line ends in arc sub-layer "Name"-A.

After selecting the two lines, radius, position and, if desired, lengthening or shortening of the lines are defined with a third mouse click.

Pressing the [**Shift**] key creates orthogonal connections.

■ VPraster pro
■ VPraster
■ VPraster LT

Circle (Radius)



For drawing a circle by defining the center (first click) and radius (second click) in circle sub-layer "Name"-C.

Circle (2-point)



For drawing a circle through two points (= diameter) in circle sub-layer "Name"-C.

Circle (3-point)

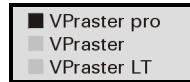


For drawing a circle through three points in circle sub-layer "Name"-C.

Ellipse



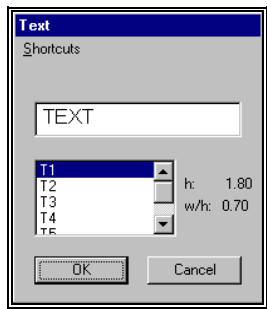
For drawing an ellipse with the center point (first click), one major (second click) and one minor (third click) half axis in ellipse sub-layer "Name"-E.



Text



For writing text in the **TEXT** layer (if a vector layer is currently active) or in the **RASTER** layer (if it is currently active). After selecting this function, draw a line to determine the text start point (first click) and its direction. Use the **[Shift]** key for orthogonal placement. A dialog box appears for text entry:



Use the text font to set text height and the width ratio as well. Enter preset special characters (under **Options - Settings - Shortcuts**) using **[Alt+1]** thru **[Alt+9]** or **[Alt+A]** thru **[Alt+O]** or the menu item **Shortcuts**.

Dimension Arrow



For placing a dimension arrow at the end of a dimension line (first selection), which intersects with or ends on an extension line (second selection). The point ends at the second line. See **CAD Options** regarding arrowhead size.

Pointing Arrow



For placing a pointing arrow onto a line. **First mouse click** selects the line on which you wish to place the arrowhead. **Second mouse click** sets the position of the arrowhead. See **CAD Options** regarding arrowhead size.

Donut



For placing a donut at the selected position on a line. In the area of line intersections or forks it is placed precisely at this position if it lies within range of cursor snap. Donut size is determined by the active post processing parameter setup.

■ VPraster pro
■ VPraster
■ VPraster LT

Hatch (Fill)



After selecting this function, select the bordering lines in sequence. Pressing [Enter] creates the hatch or fill (solids) inside the borders in accordance with the settings made in **CAD Options**. At a selected text string inside the borders the hatch will be cut out to allow the text string to stay separate.

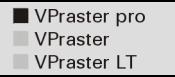
If the area to be hatched is not completely enclosed by bordering lines, it can result in missing hatch lines.

Insert Block



After they have been created, blocks can be selected and inserted. After placing a block, it can be modified using the handles to **move**, **scale** or **rotate** it. After making any corrections, confirm the operation by clicking the **right** mouse button. The block is attached to the cursor for an additional placement. Clicking the **right** mouse button a second time aborts the **Insert Block** operation.

See also **Section 11**.



Combining Vector Elements

The program allows you to combine selected (vector) elements to form a whole or even a new element. These functions can be applied to vectors generated by vectorization as well as to manually drawn elements.

In this sense, "to combine" means to group elements, for example, two or more lines segments to form a **single** line or a complete **single** arc. Due to a poor original or imprecise drawings, the vectorization process often results in broken lines, several arcs instead of a circle, etc. Using the **Combine to** commands, clean-up can be accomplished easily, quickly and precisely.

If several elements are combined to create a new element, the new element is calculated according to the method of the least square error. For example, the outer end points of two lines being joined are not necessarily identical to the endpoints of the new line. By applying the **Regeneration** command, all elements, which originally ended on the individual lines, are drawn to the new line.

If elements with differing properties (e.g. layer or line type) are combined, the properties of the resulting object are determined by the most important (i.e. largest) element.

There are two basic methods for combining elements:

- Select the elements first, then click on the function icon (single call).
- Select the function by clicking on the icon, then select the elements and complete the function by pressing [**Enter**]. The function remains active for a subsequent operation (multiple call).

Combine to Line



Combines the selected elements to a single line. The angle of the resulting line is the mean angle of the combined elements. Arcs can be combined to lines as well.

Combine to Ortho Line



Combines the selected elements to an orthogonal line. This function can be used to deskew individual, non-orthogonal lines.

■ VPraster pro
■ VPraster
■ VPraster LT

Combine to Polyline



Combines the selected elements to a polyline. With the exception of lines, any element is exploded into its raw vectors. Use this command to combine individual polyline segments (e.g. on a map) to a single polyline. See also **Section 4**.

Combine to Spline



Combines the selected elements to a B-spline. See also **Section 4**.

Combine to Arc



Combines selected elements to an arc.

Combine to Circle



Combines selected elements into a circle.

Combine to Ellipse



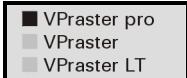
Combines selected elements to an ellipse.

Combine to Text (Interactive Text Recognition)



Transfers the selected elements (usually a window selection) to the text recognition routine. Preferably, those text passages which were **not** or only **incompletely** converted during automatic text recognition are selected. It is possible to include previously interpreted text in the selection.

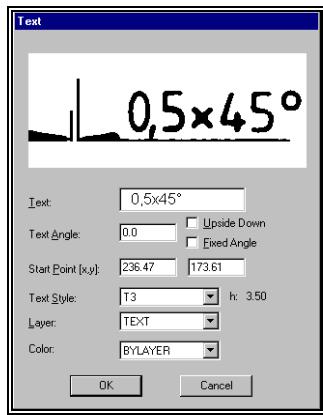
A text recognition dialog box appears, displaying a section of the selected raster area so you can check the process.



Recognized text appears in the **Text** window, where it can be edited if desired. Other values provided are **Text Angle**, **Start Point**, **Text Style**, **Layer**, and **Color**. These values can be changed as well.

The **Upside Down** check box allows you to rotate the text by 180°.

The **Fixed Angle** check box "freezes" the search angle for subsequent operations to the set **Text Angle**. The values for **Layer**, **Text Style**, and **Color** will also be kept. Deactivating this option results in immediate reinterpretation of the text at a calculated search angle.



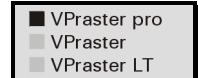
Clicking on **OK** enters the data; the text is displayed in the selected text style, and the selected vector elements are deleted.

Combine to Dimension



Combines the selected elements (lines, dimension arrows, text) of a measurement to a **dimension block** and transfers the block into the layer **DIMENSION**.

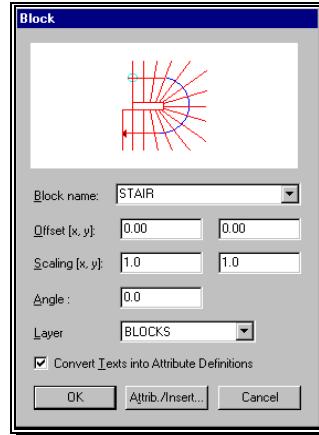
Please note the sequence in which you select the lines. Select the dimension line first, then the extension line(s). In any case a text string **must** be included in the selection.



Combine to Block



The selected elements are combined to form a block. A dialog box appears, in which you can enter a block name of your choice:



The last-used block name is suggested and its geometry displayed. When you accept it (**OK**), the selected elements are replaced by this block. If you enter a new block name, the geometry of the selected elements is displayed. Click **OK** to form the block.

If you choose **HATCH** as a block name, this does not create a new block, but the selected elements are combined to a hatch.

See **Section 11** for detailed information about **blocks** and **attributes**.

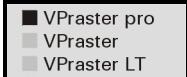
Assign Elevation



Automatic: After clicking this icon select the group of polylines/splines to be assigned by drawing a line crossing the polylines/splines. The selected elements are displayed white or black (depending on the background color).

Manually: After first selecting polylines/splines using the standard selection techniques (pick, window, cross) and then clicking this icon the elevation value for each polyline/spline can be entered. The element in process is displayed white or black (depending on the background color).

Each polyline/spline being modified will automatically be moved into the layer **ELEVATION**, which has the default color **green**.



For entering the required elevation data a dialog box opens:



Automatic

Start at Elevation determines the elevation value of the first polyline (e.g. the polyline/spline which was the first crossed by the selection line).

Step Size is the value of each step, which will be added to or subtracted from the elevation value at each following line.

Increasing or **Decreasing** determines whether the step value will be added or subtracted.

If **Stop and Show each Polyline** is **on** the assigning process will stop at each polyline displayed in white/black color and the dialog box shows the actual elevation value in the field **Start at Elevation** for manual editing.

If **Stop and Show each Polyline** is **off**, the whole process is performed automatically. Use **Edit-Properties [Enter]** for reviewing and editing the assigned elevations.

Manually

Elevation determines the elevation value of the currently processed polyline/spline.

Skip ignores the assignment for the currently processed polyline/spline.

Clicking **OK** will move the assigned polyline/spline into the layer **ELEVATION** and step to the next polyline/spline of the selection.

Section 12

This section applies to:

<input checked="" type="checkbox"/>	VPraster pro
<input type="checkbox"/>	VPraster
<input type="checkbox"/>	VPraster LT

Operation: Blocks

General Information

In the following sections, it is well to understand the distinction between a **block definition** and a **block**:

- A **block definition** defines the geometric structure of a block as well as the number and types of its attributes. A block definition is unique and is not part of the displayed drawing.
- A **block** is the image of a block definition at a given position. It can be rotated and scaled (isotropic and non-isotropic). Any number of blocks of a block definition can be inserted in a drawing.



Selected elements can be combined to a block. Only vectors can be part of a block definition. You create a block with previously selected elements by using the **Combine to Block** command. These become part of the file you are editing and can be placed at any location using **Insert Block**.



When switching to the vectorization mode, all block definitions of the AutoCAD database will be also available. These blocks will be displayed only with the name of the block definition.

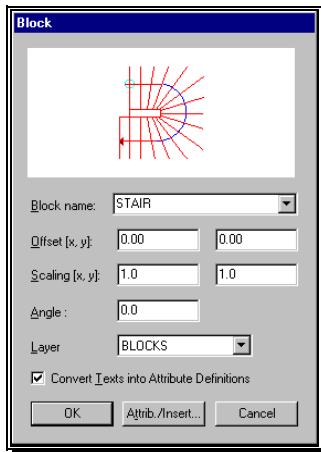
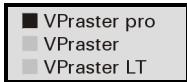
A block definition can be assigned **attributes**, whose procedure and functionality are similar to AutoCAD. Assignment of attributes is especially important for **symbol searches**, since replacing the found symbol with a block makes it possible to read the attribute text from the drawing.

Creating Blocks

Combine to Block



The selected elements are replaced by a block. A dialog box appears for selecting a block definition:



The name of the last-used block definition is suggested and its geometry displayed. If an existing block definition is chosen from the list of available names, the selected elements are replaced by **that** block.

If you enter a **new** block name (that hasn't yet been used), the geometry of the selected elements is displayed. Clicking on **OK** creates a new block definition with this appearance, and the selected elements are replaced by a block of this type. The insertion point of the block reference is placed in the geometric center of the block structure.

Offset determines the position of the block in the drawing. If the default is not modified (via the keyboard or **[F2]**), the insertion point is calculated from the geometry of the selected elements and the block definition.

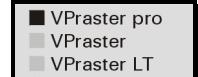
Defaults: **0, 0**

Scaling and **Angle** determine the size and angular placement of the blocks when inserted. The block definition itself remains unmodified and corresponds to its elements in location and size.

Defaults: **1, 1, 0°**

Use **Layer** to assign a layer to the block.

Default layer: **BLOCKS**



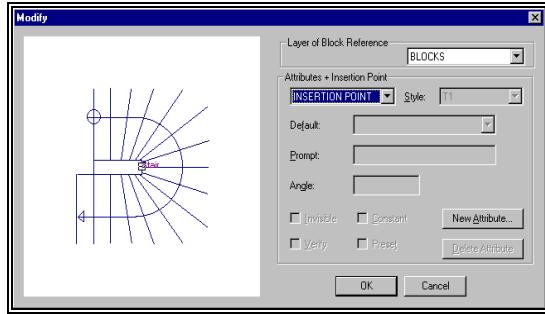
Convert Text into Attribute Definitions [on/off]: This check box is only accessible when generating a new block definition and when text have been selected. When this option is turned on, the selected text is interpreted not as geometric block elements, but as attribute text, if **Attributes/Insertion Point** is clicked afterwards and attribute names are assigned.

If the selected or newly-created block definition contains attributes without fixed values, clicking on **OK** will bring up a dialog box for entering the relevant text attributes.

Attributes/Insertion Point

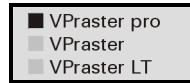
This function can only be accessed when a new block definition is being created and attributes can be assigned. A dialog box appears in which you can move the insertion point, change the block definition's layer, and set attributes.

If **Convert Text into Attribute Definitions** is activated, a dialog box appears first for each text so that you can set the attribute definition (see **New Attributes**).



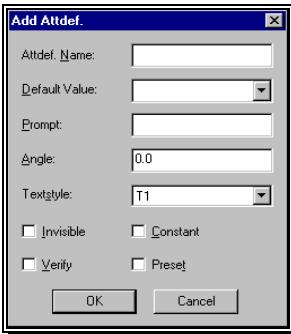
If **Insertion Point** is highlighted in the selection list, it can be moved using the mouse; the insertion point snaps to line ends and intersection points. If an attribute definition is highlighted in the selection list, the corresponding text is highlighted in color and has handles for moving and rotating. In addition, the parameters are displayed in the corresponding fields and can be changed as desired.

Clicking **OK/Cancel** returns you to the **Block** dialog box. A new block definition is provided in either case. (By choosing **Cancel**, any changes made to the insertion point and attribute definitions are undone.) The button **Attribute/Insertion Point** and the block name field are now inactive. Clicking on **OK** again finally transfers the block definition into the drawing's database.



New Attributes

New Attributes opens an additional dialog box for defining attributes.



The following settings must be entered for **each** attribute:

- **Attribute Definition Name**
- **Default Value** Default value of the attribute when the block is inserted. If the **Default value** is not defined, the attribute name is displayed instead in the block definition preview. (See the topic **New Attribute** in **Section 4** for more information on **Default Value**).
- **Prompt** (Brief) text displayed instead of the attribute name when viewing attribute values.

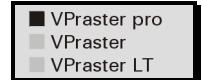
In addition, **Angle** and **Text Style** can be set.

Default Angle: 0°
Default Textstyle: T1

The attribute function can be set using the following checkboxes:

- **Invisible** Attribute not displayed in the block
- **Constant** AutoCAD flag: Attribute value cannot be edited or positioned in the block
- **Verify** AutoCAD flag: has no meaning here
- **Preset** AutoCAD flag: has no meaning here

Clicking **OK** completes definition of attributes and closes the dialog box. The new attribute definition is displayed with its default name in the geometry of the block definition. It automatically becomes the highlighted entry in the selection list and is displayed as such.

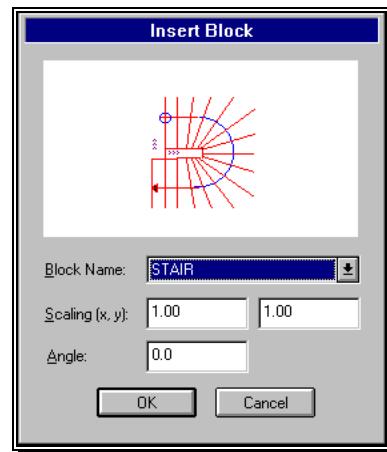


Click on **New Attributes** again to create additional attribute definitions for this block definition.

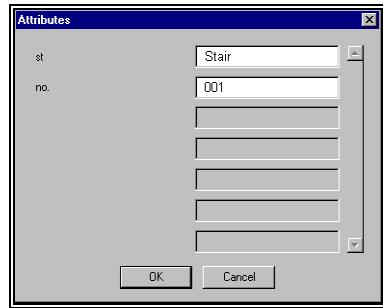
Insert Block

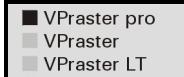


Any available block can be selected and inserted. After placing a block, it can be modified using the handles to **move**, **scale**, or **rotate** it. After making any corrections, confirm the operation by clicking the **right** mouse button. The block is attached to the cursor for an additional placement. Clicking the **right** mouse button a second time aborts the **Insert Block** operation.



If attributes have been assigned, a dialog box appears for entering the attribute text before placing the block.





On the left side all attributes without a fixed value are listed; the attributes are set with the default text.

After entering the information and clicking **OK**, the block and its insertion point are attached to the cursor for placement. The block has handles for

- moving
- isotropic scaling
- non-isotropic scaling (x and y direction)
- rotating

In addition, every attribute not set with a fixed value has two handles for

- positioning and
- rotating

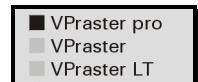
Click the right mouse button for final placement. Due to the multi-placement function, the block is again attached to the cursor, or the dialog box for entering attribute values reappears. Cancel or complete the operation by clicking the right mouse button.

Modifying Block Definitions

Using **Options - Block Definitions**, existing blocks can be modified, attributes can be added or deleted, and block definitions can be replaced.

Section 13

This section applies to:



Operation: Symbol Search/Replacement

General Information

Symbols searches for vector structures identical or very similar to a preset prototype symbol. The vector structures found are replaced either by an existing block of the same name in the drawing, or by a block assigned to the prototype when it was created. The blocks can be generated by the program (see **Section 10**). The blocks should approximate the search symbol in size and appearance (connections).

Prototypes of the symbol to be found serve as the basis for a symbol search in an original document. The prototypes are created from 1 to 3 symbol structures in an original by marking them with a window. Using the selected symbols, **VP HybridCAD** generates a prototype with tolerance values and displays it graphically. If you choose the symbol structures correctly, you can precisely isolate the search symbols while allowing as much tolerance as necessary to ensure the recognition of as many symbols as possible. Prototypes are saved as **.PSB** files, preferably in the **SUPPORT** subdirectory, so they are available for other originals as well.

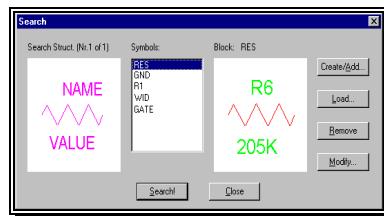


Symbols with a high degree of complexity cause long search times and poor search results, even without finding a match. In this event, the alternate choice is to manually replace symbols with a block.

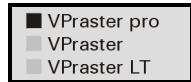
Symbols



Invoking this command brings up a dialog box displaying all loaded prototypes and the corresponding blocks.



When you click on a symbol name, it is graphically displayed with the exchange block and activated for a **Search!**. To search for multiple symbols, activate them by pressing **[Ctrl]** or **[Shift]** when selecting.



Search!

The **Search!** button is only functional after the activation of at least one prototype. When you press **Search!**, the program searches the whole drawing or the previously selected areas for the selected prototypes. The number of symbols found is displayed upon completion of the search.



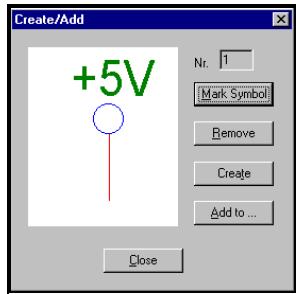
The displayed block replaces all symbols found of a given prototype. The block is fitted into the drawing in such a way as to provide maximum geometrical congruence of the original and replacement symbols.



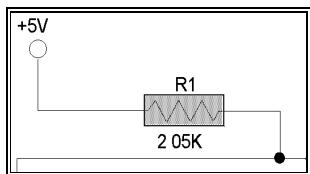
Please note that blocks are only rotated, not scaled! (See item **Modify** for scaling).

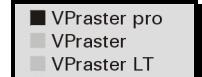
Create/Add

An additional dialog box appears:



Clicking **Mark Symbol** hides all dialog boxes, allowing you to mark a symbol structure with its text if it will be assigned to the symbol block later in the drawing using a **selection window**.





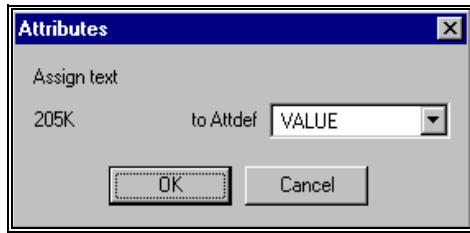
Several symbol structures can be marked in succession. These are later used to generate the prototype, thus expanding the tolerance range. When a symbol is marked, the **Number of Structures** is incremented by 1. When making a selection, the window should completely enclose the symbol, and a short length of any diverging lines should be included. Text selected along with the symbol serve only to identify the location of the attribute text in the drawing in the case of exchange blocks with attributes. This location need not be identical to its location in the exchange block. The geometry of each marked symbol structure is displayed in the graphical window.

If **no** text strings have been selected but the exchange block **does** have attributes, the drawing is searched for text at the relevant attribute locations in the exchange block.

If text strings have been selected but the exchange block **does not** have attributes, the drawing is searched for text although they are not necessary to recognize the symbol.

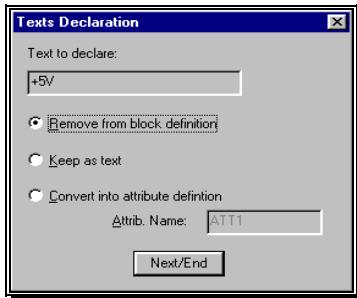
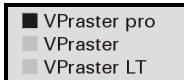
Create

When you click on **Create**, the marked symbol structures are used to generate the **prototype**, which must be saved (with a name of your choice) with the **.PSB** extension before it can be used in a symbol search. If the prototype contains text, you are asked to which attributes of the exchange block (if available) these text are to be assigned. Accordingly, the prototype does not display the text contents, but the names of the exchange block's attributes.



If the exchange block does not have attributes or any prototype's text(s) are not assigned to the attributes, the string "**text**" appears in the graphic display of the prototype.

If no exchange block is available as yet, a block is created from the symbol structure which was marked first. If it contains text, a message appears prompting you to assign each text item the desired meaning from a selection list.



Remove from block definition. The displayed text string does not become part of the exchange block.

Keep as text. The displayed text becomes part of the exchange block.

Convert into attribute definition. The displayed text string is removed from the block and converted to an attribute definition. After you enter its name, the text becomes the default of the attribute. Insertion point, text size and parameters of the attributes can then be modified using **Options - Block Definitions - Modify**.

By default all PSB files are saved in the **SUPPORT** subdirectory.

Add to

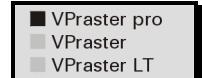
An additional search structure with a different geometry is created for an existing prototype. The program searches for this additional search structure just like another prototype, but the same exchange block is used. A search symbol (prototype) can contain any number of search structures; even symbols of a very different appearance can be replaced by an identical new symbol (block).

Remove

If you have made an incorrect selection, click this button to delete a marked symbol.

Close

The dialog box closes, and the **Search Symbols** dialog box is reactivated. **No** prototype is created.



Load

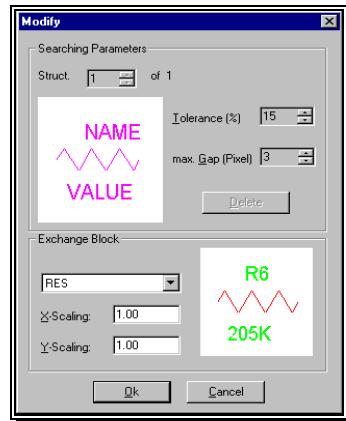
You can load existing prototypes (.PSB files). When a file is loaded, the display shows the search symbol (prototype) as well as the block, which is inserted instead of the symbol.

Remove

A currently loaded and selected prototype file is removed from the list. The button is only active if at least one file is loaded.

Modify

The prototype's searching parameters can be changed. In addition, the symbol exchange block can be replaced by another existing block, and the block can be scaled.

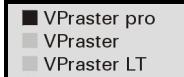


Searching Parameters

If several different prototypes have been set up for a search, the search tolerance values can be set individually for each prototype by using the **Struct.** selection box. The individual search structures are displayed.

Tolerance (%) defines the permissible tolerance range for a search.

Range: 5 thru 75 %
Default: 15 %



Max. Gap is the largest break (e.g. open line segments in the symbol contour) in pixels that will be tolerated during a search.

Range: 1 thru 20 Pixels
Default: 3 Pixels

The values displayed have been calculated by the program during creation of the prototype. Recommended minimum settings are **Tolerance = 15%** and **Max. Gap = 3 Pixels**.

Exchange Block

A different exchange block can be assigned to the prototype (i.e. to all of its search structures). All blocks contained in the drawing are available.

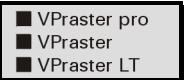
Use **X-Scaling** and **Y-Scaling** to adapt a block to the geometric requirements of the original.



Please ensure that the block's connection shape and size correspond to the search symbol.

Specifications

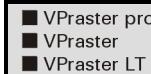
This section applies to:



General VPraster Series

Input Formats	Raster	B/W: TIFF (uncompressed, Group 3 and 4, Packbits), NIF, GP4 (CALS Group 4), CAL (Group 4), MIL, CG4, RST, C4 (EDMICS), IG4, RLC, RLE, CIT, PCX, BMP, GIF Color / Gray scale levels: TIFF (uncompressed, LZW, Packbits), PCX, BMP, GIF*, JPG, CRL, TPE, LSR Additional: All monochrome, gray scale, or color raster formats supported by AutoCAD AutoCAD supported formats RasterDWG®
	Vector	
	Hybrid (Raster + Vector)	
Output Formats	Raster	B/W: TIFF (uncompressed, Group 4), GP4, CAL (Group 4), C4 (EDMICS), CG4, RLC, RLE, PCX, BMP, GIF Color / Gray scale levels: TIFF (uncompressed, LZW, Packbits), PCX, BMP, GIF*, JPG, CRL Additional: All raster formats supported by AutoCAD AutoCAD supported formats RasterDWG®
	Vector	
	Hybrid (Raster + Vector)	
Image Formats		Dependent upon the scanning resolution: 64,000 x 64,000 pixel max.
General Functions		Raster display on/off Select Active Image Zoom Active Image Create raster image Raster snap Erase raster area (rectangle, polygon) Erase raster background Regenerate/Auto-Regenerate drawing Rasterize AutoCAD entities Rasterize to Paper Format Plot/print raster and/or vectors
VPraster pro/VPraster only:		Dynamic line weight assignment

* GIF format limited to 256 colors max.

**Functions of Raster Editor**

Window cut*, crop*, cut to format*
Deskew raster file*
Rotate raster file*
Mirror raster file*
Invert raster file*
Rubber sheeting (4 point, multi point)*
Scale drawing*
Despeckle raster file/window (B/W): 1 thru 128 pixels
Fill holes in raster file/window (B/W): 1 thru 128 pixels
Filter: Smooth raster
Copy/move raster (rectangle, polygon)
Split raster file
Merge, adjust 2 raster files

VPraster/VPraster pro only:**Min. System Requirements**

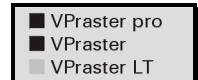
AutoCAD R14/ 2000 or AutoCAD LT 97/98/2000,
Pentium CPU, 32 MB RAM,
SVGA adapter with 256 colors min.,
resolution 800x600 pixels min.

Recommended Hardware

Pentium 300 or higher,
32/64 MB RAM for B/W or small color drawings
128+ MB RAM for standard color drawings
400 MB free hard disk space (for color drawings)
1024x768 SVGA adapter with windows accelerator

* True color operation possible

VPraster/VPraster pro



Scanner Interface CalComp, Colortrac, Contex, Imtec, Océ, Vidar, WideCom, Xerox

Draw/Erase Raster Elements Line, polyline, arc, circle, rectangle

Raster Editing Copy*, Move, Erase raster selection (arc, circle, line, polygon*, window*, pick*, or inside window)
Smooth raster selection (arc, circle, line)
Fill raster, Erase raster (B/W only)
Edit raster text

Raster Object Paste from file*
Copy to file
Create by arc, circle, line, polygon*, window*, pick*, or inside window selection
Move*, Copy*, Scale*, Rotate*
Rasterize*

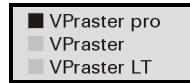
**Tracing
(Line Following)** File or window area
Background (B/W) erasure of raster selectable
CAD entities (line, arc, circle)
Contour line
Dashed contour line (B/W only)
Pick tracing*

Settings Zoom window
Produce splines
Assign elevation
Vectorization method:
 Centerline – Outline – Centerline/Outline
Straightening parameter

Accuracy ± 1 pixel = ± 0.0635 mm = ± 2.5 mils (@ 400 DPI)

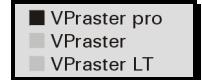
Color Operations Filter*: custom filter up to size 7×7 pixels
Color reduction: automatic/interactive
Color separation
Color classification*
Load/save palette
Contrast/brightness/gamma correction

* True color operation possible



VPraster pro

Vectorization (B/W)	Area	File, window or polygon area
	Methods of Vectorization	Centerline Outline Centerline/outline
	Threshold	selectable 5 thru 63 pixels
	Max. Size	64,000 x 64,000 pixels
	Accuracy	$\pm 1 \text{ pixel} = \pm 0.0635 \text{ mm} = \pm 2.5 \text{ mils (@ 400 DPI)}$
Vector Post Processing		Whole file or selected items Line, arc, circle, ellipse extraction Small circle recognition/replacement Line width (weight) classification Line straightening, line chaining Line type recognition: dashed, dash-dotted Element and line width assignment to layers Angle correction Gap jump Coord snap Arrowhead, Connection dot (donut) recognition Hatch extraction Text recognition (OCR)
Symbol Search	Settings	Symbol search and extraction/replacement with automatic attribute assignment Parameter files (load, edit, save)
CAD Entities	Settings	Draw: line, polyline, spline, arc, circle, ellipse, Insert: arrowhead, connection dot (donut) Hatch: create, explode, erase Entities: adjust, move, copy Text: create, move, rotate, scale Block: insert, create, rotate, scale Object snap general, to end of entity, to center of line Length of pointing and dimension arrowhead Hatch: single/cross, angle, line distance Transparency: on/off, fix/variable
Functions of Vector Editor		Edit, chain, adjust: line, polyline, spline, arc, circle, ellipse Edit line types, text Modify layer assignments Review texts Create, explode, edit blocks Create and edit block attributes Explode entity

**Functions of Vector Editor**

Create, edit dimension
Build corners between elements
Smooth transitions between elements
Trim elements
Assign elevation

OCR

Choose character set from 28 languages
Special characters, handwritten text recognition

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Appendix A

This section applies to:

- VPraster pro
- VPraster
- VPraster LT

Error and System Messages

All data belonging to this parameter set will be deleted. Do you wish to continue?

The selected parameter set will be overwritten with the system default values, thus irrevocably deleting the previously contained data. If you want to keep them, you have to save the parameter data to a PCF file first. This function deletes only data in memory, not the corresponding file on disk.

**An Error "number" occurred during the Hardlock conversion.
Please contact your dealer!**

You have tried to update your hardlock, but the error "number" has occurred. Contact your dealer or softelec for assistance.

Block "*name*" already exists. Do you want to redefine it?

The system checks for already existing blocks in the vector data base. If it finds matching block names, only the original or the imported block will be kept. If you click on 'Yes', all instances of this block in the drawing will be updated the next time the image is redrawn. If you choose 'No', however, the block definition in the imported file will be ignored.

Cannot cut object.

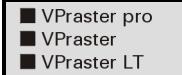
The requested operation could not be performed on that vector type or block.

Cannot load "*name*": "*reason*"

The given file could not be loaded for the given reason. Therefore, the current action will be aborted. Correct the problem and try again.

Cannot open file "*name*". System error code: "*number*"

The given file cannot be loaded. The specified system error code depends on the operating system. Reasons for the load failure include corrupted files or insufficient physical memory. If this message reappears while having at least 5MB of free memory at program startup, you have to re-install the file.



Cannot save "name": "reason"

The given file could not be saved for the given reason. Therefore, the current action will be aborted. Correct the problem and try again.

Color already used! No changes!

It is not possible to change the entry of a palette to a value that already exists in this palette. The modifications you have tried are discarded.

Corner creation not possible. Cannot find a cross point inside the search area or wrong selection. Select two lines or two arcs or one line and one arc or one polyline (to close it) only.

The operation could not be carried out logically. Ensure that there are no additional objects accidentally selected such as a stray arc or a third line.

Could not trim. Object has no crosspoint with reference object or wrong selection. Selectable objects: polylines, lines, arcs, and circles (only as reference object).

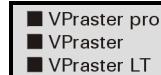
The operation requires that the trim line or the line to which other lines will be extended be selected first, if not the command aborts with an error message. Ensure that there are no additional objects accidentally selected that cannot be extended such as a circle.

"count" symbols found.

When the symbol search completes its search, it displays the number of symbols found. If required, the *Redraw* command display these blocks as a different color on screen. In the event that not all symbols are found or none at all, try getting better results by varying the selected patterns in the prototype generation. If all fails, because of a poor drawing, manually create blocks using the Block icon.

Deskewing is not necessary, since you specified a deskew angle of zero degrees.

No real explanation necessary. However, if you also invoked the speckle command, etc., it will be aborted. Do speckle removal separately.



Error loading classification!

The classification could not be loaded, the process was aborted. The file may be corrupt. Try to load again.

Error loading probes!

The probes could not be loaded, the process was aborted. The file may be corrupt. Try to load again.

Error opening file!

The file could not be loaded, try loading file again.

Error saving classification!

The classification could not be saved, the process was aborted. Try to save again.

Error saving probes!

The probes could not be saved, the process was aborted. Try to save again.

Error writing to palette file!

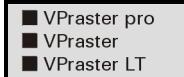
The palette file could not be saved, the action was aborted. Try another file name or disk.

File error reading signature!

The file you have tried to load has valid extension, but was not generated with **VP HybridCAD** software.

Invalid file signature.

The given file is not a valid raster image. Either it does only accidentally have a known extension or it has been corrupted or overwritten. Create a new file.



No block reference. Create or import a block reference first.

The vector data do not contain a block for insertion. Use the **Combine to block** command to first create a block.

Palettes do not match! Loading cancelled!

The palette you have tried to load is not the same as the actual palette of the image. Loading was cancelled and the palette remains unchanged.

Pick point is outside drawing boundaries.

The split line is placed outside the drawing. If you have accidentally entered too many split lines first, abort this command (**right mouse button**) and try again.

Requested palette type not found in palette file.

You have tried to load a **VP HybridCAD** palette file that does not contain all the information required for this operation. The file was probably saved using **Raster – Color – Save Palette**. You need a palette file saved using the **Save** option of the **Color Reduction** dialog.

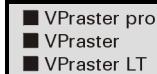
Rotation is not necessary, since the drawing does already have the requested orientation.

No explanation necessary.

Security key not found.

There is no access to the software hardware lock. Check the key installation and try again.

You have not installed your hardware lock. Connect it to one of the parallel ports of your computer (LPT 1...3) and try again. If a printer or some other device is connected to the same port, it must be switched on to ensure proper operation of the hardware lock.

**The automatic zoom in feature will be disabled since the specified grid is too dense.**

The specified grid is too dense to compute the related zoom positions. In this case the automatic zoom in function is disabled, but the grid stays active for the second point. This may happen, if the **Drawing Scale** or the **Units** of the **User Coordinate System** are not set up properly.

The entered Serial Number is not valid!

You have tried to update your hardlock, but the entered serial number (which is printed on the softelec label on your hardlock) is not correct. Please check your serial number and try again.

The entered Update Password or the Password Length is not valid!

You have tried to update your hardlock, but the password(s) or the password length (=number of passwords) is not correct. Please refer to the information along with the software for the correct password(s) and password length. Contact your dealer or softelec for assistance.

The raster transformation could not be carried out correctly, since there was a internal error detected.

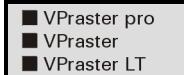
This message usually only appears when you ignore the **Abort Transformation?** message. During the transformation an error occurred, which stopped the transformation.

The speckle size is too large. It can have a maximum value of "number" pixels.

The despeckling function limits the size of speckles and holes that can be found automatically. Only objects consisting of less than "number" pixels can be found.

There are already vector data present in the vectorization area. Do you want to clear them first?

Where you want to execute multiple vectorization commands on the same drawing, the system keeps track of the vectorization areas in order to avoid overlaying vector data. Click 'Yes' if you want to delete previously generated vectors. In some cases, however, it may be useful to obtain multiple vectorized data on top of each other, for example, generated by different vectorization methods. Then click 'No' to keep them.



There are too many elements selected. The hatch processor can only handle 100 vector objects.

The area you want to hatch is too complex. Try to simplify it using the ***Combine to*** commands.

This drawing is too large for the demo version.

If you choose "Yes" you will be asked to cut out a window (click in the middle of a 1800 x 1200 Pixel large area you want to work on). If you choose "No" you won't be able to use any VP HybridCAD function.

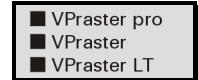
This is a limitation of the demo version of the **VP HybridCAD** software. You can only process a small part of your drawing which you can select arbitrarily from the loaded image. Click wherever you like, the left mouse button to cut out a valid drawing area for testing. Please ask your local dealer to get a full version of the program.

This function is only available in the full version.

This is a limitation of the demo version of the software. Please refer to your local dealer to get a full version of the program.

This function requires a display driver that supports 256 colors or more.

The layer preview takes full advantage of the features of the installed graphics board to achieve its tremendous speed. This, however, requires installation of a video display driver supplied by your graphics board manufacturer that supports at least 256 colors. Use Windows Setup to install your display board driver.



Unknown compression scheme.

The given file uses an unsupported compression scheme. Please use a conversion program that generates one of the following supported formats:

Extension	Format
TIF	Uncompressed, compressed (Group 3 and 4), LZW, Packbits
NIF	Navy TIFF
PCX	Packbits
CAL, MIL, GP4, CG4, RST	CALS Group 4 Type 1 and 2
RLC, RLE	Run Length Coded
GIF	LZW
BMP	Only uncompressed
C4	EDMICS VI, Group 4
CIT, IG4	Group 4
TPE, LSR, CRL	Intergraph Color
JPG	JPEG

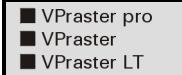
Unknown file format.

The file you have selected for loading is not recognized as a valid file format. If the file, for example, is a valid **TIFF** file but without the extension ".TIF" you can use the alias extensions described in **Appendix B** to be able to load the file.

Unsupported color information.

The given file contains an unsupported color information. Please use a conversion program that generates one of the following supported formats:

Extension	Format
TIF	B/W, 256 colors (palettted), true color
NIF	B/W, 256 colors (palettted), true color
PCX	B/W, 256 colors (palettted), true color
CAL, MIL, GP4, CG4, CIT, IG4, RST	B/W
RLC, RLE, C4	B/W
GIF	B/W, 256 colors (palettted)
BMP	B/W, 16 colors, 256 colors, true color
TPE, LSR, CRL	256 colors (palettted)
JPG	256 colors (palettted), true color



Update of Hardlock not possible!

More than one softelec Hardlock is connected to this computer!

None of the hardlocks currently connected to your computer is able to run this Version of **VP HybridCAD**. If you have an update password for one or more of these hardlocks, only one hardlock can be updated at a time. Disconnect all other hardlocks but the one with the serial number according to your update password and try to start **VP HybridCAD** again. Then, follow the instructions. Contact your dealer or softelec for assistance.

Warning: Your reference points may cause unexpected results. We recommend you to select more reference points or to select a lower order transformation function. Abort transformation?

The parameters of the transformation function change significantly with only small changes in the coordinates of the inserted reference points. This produces unstable mathematical equations for calculating the target raster file (after rubber sheeting) causing unexpected results. This message may occur when using the **Quadratic** or **Cubic** function with a small number of reference points. Solve this problem by using a lower order function or insert more reference points. We recommend inserting at least 16 points using the quadratic function, and 25 points using the cubic function.

Wrong selection. Select a line or a polyline.

You can insert a **Donut** only on a line or a polyline.

Wrong selection. Select a line, a polyline, an arc, or a circle.

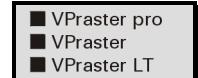
You can insert an **Arrowhead** only along the specified objects.

Wrong selection. Select a line, a polyline, an arc or a circle.

The selected object cannot be part of a contour for hatch. Only the specified objects are allowed.

Wrong selection. Select the point of the arrowhead on the selected object.

To insert a **Pointing Arrowhead** the selected object must be picked twice. The second click specifies the point position of the arrowhead.



Wrong selection. Select two lines or two arcs or one line and one arc or one polyline (to close it) only.

The operation could not be carried out. Ensure that there are no additional objects accidentally selected.

Wrong selection. Select at least two objects.

The operation will refuse to run if only one object is selected. First select a reference object and then additional objects which should be extended to this.

You cannot place more than 4 borders.

The number of split borders is limited to four in each (horizontal and vertical) direction. If you want to split the drawing in more parts, you have to use this command repeatedly.

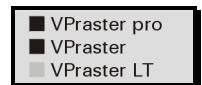
Your current hardware lock does not allow you to run this program. Please enter update password below.

The hardware lock currently connected to your computer belongs to an older or different version of **VP HybridCAD**. Please enter the update password that you received together with the software. Contact your dealer or softelec for assistance.

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Appendix B

This section applies to:

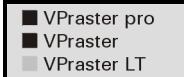


Scanner Interface

Supported Scanners

The following table contains all currently supported scanners:

Manufacturer	BW / Grayscale	Color
CalComp	ScanPlus III 300 ScanPlus III 500 ScanPlus III 600 ScanPlus III 800 ScanPlus III 1000 ScanPlus III 80 ScanPlus III 400-T ScanPlus III 600-T ScanPlus III 800-T ScanPlus III 1200-T ScanPlus III 1800-T ScanPlus III 800 T PLUS ScanPlus III 800 T COPY	ScanPlus III 500 C ScanPlus III 800-C
Colortrac		CT 36-400 360 CX 360 GX 380 CX 380 GX
Contex	FSS 3000 MP FSS 5000 MP FSS 8000 MP FSS 10000 MP FSS 3200 ^{DSP} FSS 5200 ^{DSP} FSS 6200 ^{DSP} FSS 8200 ^{DSP} FSS 10200 ^{DSP} TDS 8000 ^{DSP} FSS 4300 ^{DSP} FSS 6300 ^{DSP} FSS 8300 ^{DSP} FSS 12300 ^{DSP} FSS 18300 ^{DSP} FSS 8300 PLUS ^{DSP} FSS 8300 COPY ^{DSP}	FSC 5000 ^{DSP} FSC 8000 ^{DSP} FSC 3010 ^{DSP} FSC 5010 ^{DSP} FSC 6010 ^{DSP} FSC 8010 ^{DSP} FSC 5010 COPY ^{DSP} FSC 8010 COPY ^{DSP} FSC 3040 CHROMA FSC 6040 CHROMA FSC 8040 CHROMA FSC 3050 MAGNUM FSC 6050 MAGNUM FSC 8050 MAGNUM

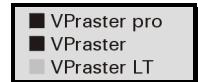


Imtec	3520	3720C
Océ	G6015 G6035 G6045 G6055 G6015-S (4710) G6035-S G6035-Sx (4720) G6045-S 4715 4725 4730 4740 4750	4780 4790
Vidar	TruScan 800 TruScan Flash TruScan Select	TruScan Spectra TruScan TITAN
WideCom	SLC436 SLC836	SLC436C SLC836C
XEROX	7346 7356	

The software supports the following **scan modes**:

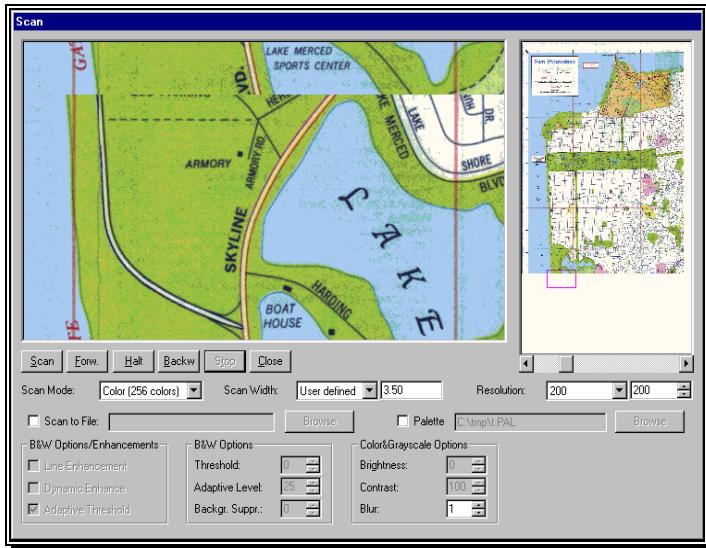
- Black/white
- Grayscale
- Color (Indexed, 256 colors max.)
- True color

All other options will be activated or deactivated according to the specifications of the connected scanner device.



Scan Dialog

Dialog



Above screen interface may not always be available with WideCom scanners.

Functions

The upper area of the dialog is divided into two areas:

Left window: Display of zoomed area, scaled 1:1

Right window: Overview window: A small frame indicates which area is currently displayed in the left window.

Buttons:

Scan Start scan

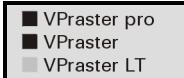
Forw. Prescan forwards

Halt Halt prescan (rocker mode)

Backw. Prescan backwards

Stop Stop scan

Close Close scan dialog



General Functions:

Scan Mode	Sets the current scan mode (B/W, gray scale, and color).
Scan Width	Depending on scanner type: Format and/or Variable With CalComp, Océ, Contex scanners: <ul style="list-style-type: none">• Variable: Paper is left or right aligned• Format: Paper is centered Scan Width is set according to scale on scanner
Resolution	Depending on scanner type: fixed and/or variable
Scan to File	Scan directly to file
Palette	Scan using a previously generated palette (only in color mode).

Black/White Options:

Depending on the scanner type the following functions are available:

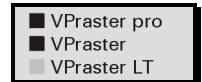
Line Enhancement	Increases the line thickness
Dynamic Enhance	Increases the contrast
Adaptive Threshold	Area dependent thresholding
Threshold	Standard threshold (0 thru 255)
Adaptive Level	Contrast threshold (0 thru 100)
Background Suppression	Suppression of speckles (0 thru 100)

Color and Grayscale Options:

Brightness	Range: -128 thru 128
Contrast	Range: 10 thru 1000 (in %)
Blur	Filter to reduce dithering in color scans : 0 thru 3

If no palette has been selected for a color scan, the following dialog box appears after pressing **Scan** or **Forw.:**





Computed Color Map

The system performs a prescan to calculate an optimized palette for the current drawing. The palette size can be selected between 4 and 256 colors.

Linear Color Map

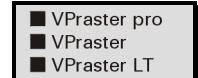
A standard palette will be used for the scan. The palette represents the whole color space.
8, 16, 27, 125, or 216 colors max. can be selected.

Description of Terms

Different manufacturers use different terms for the same functions of their scanners. The following table shows the terms used by **VP HybridCAD** software and their equivalents:

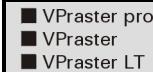
VP HybridCAD Dialog	Scanner Function
Adaptive Threshold	<ul style="list-style-type: none"> • Adaptive Area Threshold • 2D-Adaptive Threshold
Adaptive Level	<ul style="list-style-type: none"> • Area Brightness
Background Suppression	<ul style="list-style-type: none"> • Variability
Line Enhancement	<ul style="list-style-type: none"> • Edge Enhancement
Dynamic Enhancement	<ul style="list-style-type: none"> • Dark Enhancement

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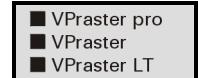


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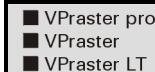
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